THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. MARCH 23, 1893. CHICAGO, ILL. NUMBER 12.

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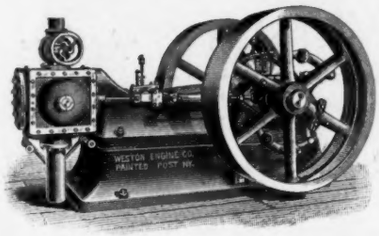

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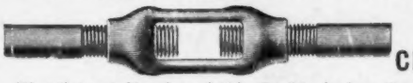

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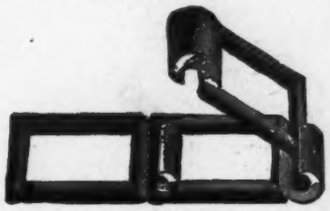

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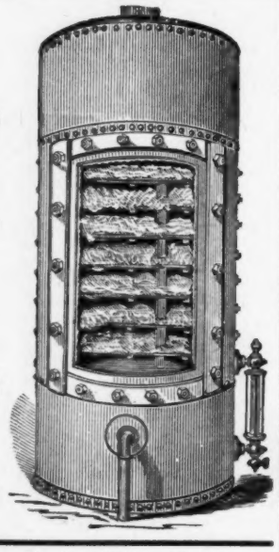

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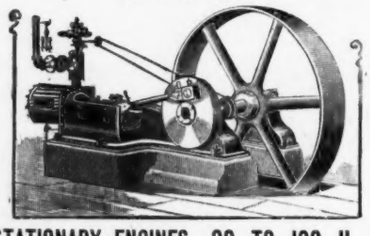

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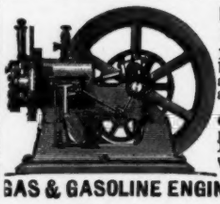

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THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. MARCH 23, 1893. CHICAGO, ILL. NUMBER 12.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The feature of the week in the iron market has been the rapid advance in Bessemer pig iron and soft steel billets, owing to the scarcity of both for prompt delivery. The existing market conditions also reflect, it may fairly be presumed, what promises to be more marked as the year grows—the increasing demand for steel. Steel products all along the line are showing greater firmness, and the chief thing in the way of a considerable advance is the choice the buyer has of returning to muck bar products should soft steel part with the advantage of economy which it now presents. Steel rail sales thus far made will keep the mills employed for some time, so that the billet market is not likely to be depressed by any considerable contributions from the Carnegie mills. Bessemer pig at $14 25, Pittsburg, and billets at $23 @ $23.25 have given the Bessemer ore market a firmer tone and the estimate that 6,000,000 tons of Bessemer ores will be required from the Lake Superior region the coming year indicates that no occasion for ruinous prices in ore will be furnished by lack of demand, at least. Foundry mill irons show little change in the week. Southern furnacemen are denying recent reports of exceptionally low prices, but the fact of contracts for deliveries running through the year are taken on the basis of present low quotations indicates no confidence that there will be early betterment.

THE CLEVELAND OUTLOOK.

The deadlock between furnacemen and ore selling firms has been broken at last, and beginning with last Friday transactions for this year's ores have been closed totaling several hundred thousand tons. The reaction seems to have come, which it was intimated in these columns six weeks ago might result from the attitude of certain large ore buyers, who had set their figure below the point of profitable operation by the heaviest producers of Bessemer ores. The second interview of representative ore men with the Carnegie Co., two weeks ago, in response to the latter's invitation to come to Pittsburg, left matters just where they were, the Carnegie Co., somewhat to the surpise of their visitors, simply renewing their original offer and stating that they would do nothing better. The transactions of the past week, and the prices on which they were based, indicate a distinct change in the situation. There is little question that if the furnacemen had been in the market in February and negotiations had then opened in earnest, the result would have been opening prices 15 or 20 cents a ton lower than those obtained the past week. While selling firms have yielded, in some instances, from the position originally taken, that opening prices for 1893 should not go below those made at the close of last season, other ores have brought the price at which sales from the docks have been made since the close of navigation. It may be said that the prices made on certain Gogebic Bessemers cut the opening prices of last year about half as much as the recent offer of the Carnegie Co. Six prominent users of Bessemer ores, representing the Shenango and Mahoning Valleys, the Wheeling District and Central Ohio, made the purchases, which, in three instances, practically cover a year's supply. The total is close to a half million tons. Gogebic, Menominee and Vermilion ores make up the bulk of the sales. Some non-Bessemers were included, but the bulk was Bessemer. Other furnacemen have opened negotiations and the prospects are that a considerable tonnage will be closed before the Carnegie Co., and the Illinois Steel Co., who are usually the early buyers, come into the market.

Pig Iron. The feverish condition of the Bessemer pig market at Pittsburg has busied Valley furnace firms represented in Cleveland, answering telegraphic offers from brokers and steel makers. Furnace firms that were regarded as exhibiting backbone, in contending for $13 at furnace a short time ago, are now predicting that $14.50, Pittsburg, will be reached by another week. The demand seems to be quite beyond the ability of furnaces to supply, at least for any deliveries earlier than May and the market is emphatically in the seller's hands. As illustrating the rapidity with which the advance was made the case may be cited of one dealer who had his quotation of $11.50 on a lot of off Bessemer refused about the middle of last week, and was offered $12.50 by the same firm two days later. The market is fairly $14.25 at this writing, Wednesday, and it is doubtful if a round lot could be contracted for in the Valley, April delivery, at that figure, the furnaces being in most instances, tied up on contracts running into May. A 5,000-ton transaction was made at $14.00, Pittsburg, on Friday, but that price has not been touched since. The largest users of Bessemer were buyers 10 days ago, and while the Carnegie Co. will not require all its output, in the suspension of operations at Duquesne, to enlarge its converters, the enlarged capacity will doub less call for the accumulation of Bessemer iron, meantime, so that it is not likely to become a seller of Bessemer. Foundry and mill irons are pursuing the pace of the past few weeks and there is no change in the quotation of $14, No. 1 foundry, and $12.25 for neutral mill iron.

Finished Iron, etc. There is no diminution in the amount of business, bu' still the day of improvement in prices is postponed. The car works demand is steady and the mills are getting beyond the point of anxiety for future orders. In structural material inquiries that come to the Cleveland market are well scattered territorially, and as to the class of material wanted. A 2,500-ton contract for plates and angles for the New York Central's Harlem River draw, has been placed by the King Bridge Co., but heavy contracts are the exception.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The past week has been only moderately active, as regards sales, but deliveries have been made in large quantities, and several new inquiries have been received for pig iron. In structural material a fairly good business has been done, the largest sale being one of 1,000 tons for a new office building. Dealers regard the outlook as encouraging, and it is expected that the demand for all classes of finished material will increase rapidly from now on.

PIG IRON.—The market has been rather quiet, sales being made only for small amounts. One feature of the situation is the fact that a number of the smaller foundries have been buying quite largely of late, several of them having recently placed orders considerably larger than is their wont. While the sales of iron are light, there is no apparent weakening in prices, and the business that has been done has developed the fact that buyers are more willing to pay the quoted prices without haggling. Lake Superior charcoal iron continues to be quiet, with no change in prices.

BAR IRON.—A moderate run of business has been done, and while there are rumors of sales made at figures a little under quoted prices, the market is nevertheless quite firm at 1.45c at the mills. There is no change in soft steel bars, which continue to sell fairly well at 1.65c to 1.70c, Chicago.

BILLETS AND RODS.—The market is quiet, little business has been done, and prices are firm at $25 for billets, and $32.50 for rods.

RAILS AND TRACK SUPPLIES.—No sales of any importance have been made, though a considerable business has been done in small lots. Quotations are as last reported—$30 to $32 for rails; 2.65c to 2.70c for track bolts, and 2.05c to 2.10c for spikes.

STRUCTURAL IRON.—One sale of 1,000 tons for an office building in Chicago has been closed, and quite a good run of orders have been received. The inquiry for future business continues good. Several new buildings projected are expected to come into the market shortly. Prices are firm and unchanged. Beams and channels, 1.90c to 2.10c; universal plates, 1.95c to 2.15c; sheared plates, 1.95c to 2.10c; angles, 1.95c to 2.10c; tees, 2.25c to 2.40c.

SHEETS.—There is no change in the situation, the sale of black sheets continuing to be fairly good on a basis of 2.85c for No. 27, and galvanized sheets having a good demand, with quotations unchanged at 70 and 7½ per cent. at the mills, and 65 and 10 per cent. to 70 per cent. from store.

PLATES, TUBES, ETC.—The inquiry has increased slightly since our last report, and a fair volume of business is being done. Quotations are firm and unchanged. Tank plates, 1.90c to 2.10c; shell steel, 2.20c to 2.30c; fire box steel, 3.75c to 4c; flange steel, 2.50c to 2.60c; tubes are selling at a discount of 62½ per cent.

MERCHANT STEEL.—A quiet business has been done, the demand from the country and nearby trade being especially good. Prices are unchanged. Open-hearth spring, 2.35c to 2.40; tire, 2c to 2.15c; machinery, 2.20c to 2.35c; crucible spring, 3.60c; machinery, 4.75c; tool steel, 6½c and upwards; Bessemer bars, 1.80c to 1.90c.

OLD RAILS, SCRAP, ETC.—Business is still very quiet, sales made being few and for only small amounts. Prices are unchanged. Old rails, $18; old wheels, $14.50 to $14.75; old steel rails, $11 to $14.50; No. 1 forge, $15; No. 1 mill, $11; turnings, $8; mixed steel, $9; coil steel, $13; leaf steel, $14; low tires, $13.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. Bessemer pig has centered all interest in the market in the past week and the price on Tuesday of the present week went to $14.25, a figure slightly beyond that reached in the spurt of last November and the highest in the market in upwards of eight months. The upward tendency has been observed in the past two weeks, but the market only came upon the fact last Thursday that buyers must needs shop about for some time to find a few thousand tons of Bessemer for April delivery. Consumption has been gradually overhauling production and several furnaces in the two Valleys have been obliged to draw out of the market on early deliveries because they were well sold up. From $13.85 on Thursday the market went to $14 before the day closed, with buyers in the market for a total of about 10,000 tons. A 5,000-ton sale was made on Friday at $14 and the advance has continued, $14.25 being the market to-day, with predictions freely made that it will go to $14.50 by April. Billets have been in sympathy with this advance in Bessemer and from being $22 a fortnight ago, are $1.25 better to-day in the eyes of some sellers, and transactions have ranged from $23 to $23.25. The changes at Duquesne from six-ton to 10-ton converters will take the capacity of that mill out of the account for the time being. For early delivery prospects favor additional advances. Foundry and mill irons are unchanged, with light sales.

Cincinnati. An increase of orders in crude iron was hardly to be expected in the midst of stringency in money matters; nevertheless, there has been a large business transacted the past week, and the tonnage booked is perhaps in excess of that of previous weeks for some time. Buyers have found that further concessions could not be had, and have been willing to place contracts for deliveries running through several months ahead at current figures. Grey forge has been sold at $8.25 cash, Birmingham, and No. 2 foundry, at $9.25. The largest producer of Southern iron reduced its stock about 4,000 tons last week, and is shipping very considerably in excess of current product. There has been a little more activity in charcoal irons, both Lake Superior and Southern. Foundries generally through the country continue busy and appear to be melting iron fully up to their normal limit.

Buffalo. Prices continue low but are firmer than for many weeks. There is quite a little activity at present although mostly for small lots from a carload to 100 tons. Considerable interest in the market is being manifested by consumers, it now being generally conceded that a very great slump in prices is improbable in the near future.

St. Louis. Few orders have been placed in the past week and the market shows a tendency towards weakness. The foundries and car works all seem to be well supplied with orders, and the indications are that some large buyers will soon have to replenish their stocks.

Louisville. There has been no change in price, and the buying has been fair. One order of 2,000 tons soft being the largest placed. Statements have been made from the South of lower prices than those commonly current, $8 to $8.25 for grey forge, Birmingham, but no evidence can be obtained of any sales having been effected at the figures reported. It is not thought possible that lower offers can be made, yet many consumers do not feel like purchasing for long deliveries, preferring to buy from hand-to-mouth. The iron from the Middlesborough furnaces is now on the market.

THE IRON TRADE REVIEW

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MARCH 23, 1893.

SITUATION AS TO CHARCOAL IRON.

Charcoal pig iron production has been a matter of earnest discussion, of late, by those connected with that industry. Unsatisfactory conditions have prevailed in the past year. Coke iron has been making inroads upon the trade and what with the decline in pig metal, by whatever fuel produced, the question of suspending operations indefinitely has been presented to some furnace managers who saw in the future a lessening opportunity for getting a new dollar for an old one. The proposition to adopt a "national" policy for the charcoal iron industry was broached, and the evils of the destructive competition then going on were reviewed in these columns, a year ago, by a well known furnaceman; but the charcoal furnace interest went on in the old way, and again its future is a subject of serious questioning.

As far as Lake Superior charcoal iron is concerned, there seems a probability, as the *Iron Age* points out, that all the product of the present year will find a market and at a fair price. The severity of the winter has made wood scarce and a good many stacks are out of blast. The advance in wood makes the cost of charcoal about ½ cent a bushel dearer, or 50 cents a net ton. The enhanced cost of iron promises to be made up by a better market price, since production is now at the lowest point in years, and many furnaces now out will not resume for some time, possibly not in the present year. The estimates of Lake Superior producers added together promise a Michigan and Wisconsin output in the neighborhood of 242,000 gross tons for 1893. In 1892 the same furnaces produced 266,547 tons, which was 40,000 tons less than in 1891 and 50,000 tons less than in 1890. Our contemporary puts the situation thus:

> At the close of the best year in recent times, 1890, the stock of unsold Lake Superior charcoal pig iron on hand was less than 20 per cent. of the year's output, or only 62,475 tons. The consumption in that year was 282,000 tons, in round numbers. The consumption in 1892 was in excess of the production, as stocks were reduced 44,534 tons from January 1 to December 31. Adding the production, 266,547 tons, to the reduction in stocks, the total consumption was 311,081 tons. The estimated output for 1893 falls considerably below these figures, being but 242,000 tons, as previously stated. Unsold stocks at the beginning of the year, according to the American Iron & Steel Association, were but 44,816 tons. Adding these to the estimated output, the total supply now in prospect still falls below the consumption of 1892.

While the demand is likely to take care of the output for 1893, and possibly at an increased price, it is questionable whether any price will be reached that will permit of the resumption of old style furnaces. Before any adequate return could be had upon this property some sort of understanding as to prices would have to be had among producers. The charcoal iron-making industry is not so extensive that this might not be compassed, but the fear of some producers that any appreciable advance might only increase the displacement of charcoal iron by coke iron, would doubtless be a strong pull-back on an effort to get together for living prices.

On March 1, 1892, and March 1, 1893, the active and idle capacity of all charcoal furnaces was as follows:

	In blast.	Weekly capacity.	Out of blast.	Weekly capacity.
March 1, 1892	48	11,550	77	11,491
March 1, 1893	35	8,727	88	12,941

That Lake Superior charcoal furnaces have been materially decreasing their output this year without going out of blast, is apparent from the following comparison, the total of Michigan and Wisconsin furnaces being taken in each case:

	In blast.	Weekly capacity.	Out of blast.	Weekly capacity.
March 1, 1892	14	5,473	13	3,646
March 1, 1893	12	4,229	14	3,653

The probabilities are that if all the furnaces now in blast were run to their full capacity they would make the call for idle furnaces to enter the producing column more seeming than real.

The special census bulletin on the charcoal pig iron industry, prepared by Dr. Wm. M. Sweet, makes the same showing as to the marked increase in the capacity of charcoal furnaces in recent years, that was made by the bulletin on the Southern pig iron industry. For example, 26 Michigan charcoal furnaces in 1890 had a combined daily capacity of 1,216 net tons, while the 25 Michigan charcoal furnaces, in 1880, had a capacity of but 709 net tons. In Wisconsin, 6 furnaces in 1890 had 377 tons daily capacity, against 288 tons daily capacity for 11 furnaces in 1880. The totals show that 140 furnaces in 1890 had 3,783 tons daily capacity, while 252 furnaces in 1880 had but 3,326 tons daily capacity.

Michigan produced over one-third of all the charcoal pig iron made in the United States, in 1890, the value of her product being $3,982,278, out of a total of $11,985,103.

What the special bulletin calls a "comparative statement"—though it cannot properly be so called, because the respective figures for the two years do not represent the same things—shows 119 charcoal blast furnaces in 1890, against 223 in 1880; $20,068,750 invested in 1890, against $27,909,919; 3,314 hands employed in 1890 (leaving out officers, clerks and salesmen) against 16,900; $1,205,061 paid as wages in 1890 (leaving out salaries of officers and employes noted above) against $4,143,551; $8,396,130, as cost of materials used in 1890, against $7,403,531; products valued at $11,985,103 in 1890, against $12,575,996. The apparent shrinkage in wages, capital, hands employed, etc., in the above is due to the fact that the statistics for 1880 included not only the investment in blast furnace plants and machinery, and the labor directly employed in pig iron production, but also the capital invested, hands employed and wages paid in mining and other operations conducted in connection with these works.

The value and character of product in the two census years is as follows:

Products.	1890. Tons.	1890. Value.	1880. Tons.	1880. Value.
Hot or warm blast charcoal pig iron	627,661	$11,238,239	355,405	$10,080,581
Cold blast charcoal pig iron	36,836	714,241	79,613	2,393,175
Castings	204	4,880	300	14,988
Value of all other products	.....	27,743	.....	87,252
Total	664,701	$11,985,103	435,318	$12,575,996

It thus appears that the increase in tonnage in the 10 years was entirely in hot or warm blast pig iron, the production of cold blast iron showing a decline of 53.73 per cent.

A PIECE OF BRITISH "TARIFF TINKERING."

Our contemporary, the London *Iron and Steel Trades Journal*, makes this comment on the provision of the McKinley law relating to the 4-cent duty on pig tin: "It was enacted that pig tin should remain on the free list until July 1st, 1893, when, if the American production has not reached 5,000 tons per annum, about a fourth of the requirements of the people, a duty of 4c per pound will be levied on all imported tin. This provision supplies one of the peculiarities of tariff tinkering that is hard to understand. The introduction of the prospective duty on pig tin was simply a piece of bluffing on the part of those who wanted the tinplate clause passed, and they calculated that their offer to submit to a tax on pig tin would be accepted as a proof of their *bona fide* belief that it never would and never could come into effect."

All of which illustrates both the luminosity of our English friends' information about the McKinley law and the density of British Free Trade comprehension of the objects of a protective tariff. The provision of the McKinley act, which our contemporary tries to reproduce, is the one *terminating* the 4-cent duty July 1, 1895, if there has not been produced in the United States in any preceding year 5,000 tons of pig tin. The idea that a pig tin industry in the United States should be asked to go without protection until it had demonstrated whether it could put out 5,000 tons in a single year, and then to be given protection only on condition that it could show that it *had not* produced 5,000 tons in any one year, is a curious jumble of protection logic. It is not surprising that our contemporary calls this "one of the peculiarities of tariff tinkering that is hard to understand." The trouble is that it is "tariff tinkering" by a British free trader.

RAILWAY BUILDING IN 1893.

New railroad construction in 1893 has not given promise, thus far, of any improvement on the record of 1892, which was 4,175 miles of new road on 300 lines. The *Railway Age*, of Chicago, has made an effort to throw some light on the situation, by gathering together a list of all new railroad enterprises projected, incorporated, or under way. This shows 424 lines in 48 States, with a total projected mileage of 28,000. Much of this will never be built—probably far the larger part; but other new companies are continually being organized and there is thus a constant replenishment of the list, oftentimes with better than paper schemes.

The *Railway Age* adds to the summary above referred to a tabulation, by States, of railroad lines on which work was in progress at the close of 1892, or is now in progress. This foots up 164 roads in 35 States and Territories, with 4,804 miles of proposed lines, on which some grading has been done or will be done. What part of this mileage will require rails in 1893, it would be impossible to say, but, as our contemporary adds, other enterprises will be actively undertaken in the next nine months, "and if the financial sky continues fair it is not unreasonable to believe that the railway construction of the coming year may equal that of 1892."

In an article which will appear in our next issue, Mr. E. C. Pechin pursues farther the question of coke-making at Lake Superior points, and cites further authorities on the subject of "weathering." He regards it of great importance to the interests of the Northwest that coke-making in close proximity to its iron ore deposits be made an early and unqualified success, and shows that so far from being an opponent to coke-making at Lake Superior he is its earnest friend and well-wisher.

A steady enlargement of the capacity of prominent producers, in all iron lines, from ore to wire and nails, puts the market beyond the point at which an exceptionally large contract has any buoying effect upon prices. The equilibrium is only maintained, as it is, by the inactivity of a constant fraction of productive capacity. Up to a certain point demand might grow steadily, and be taken care of, without the building of another furnace or mill.

Thomas A. Edison and his associates in his "iron campaign" in all probability will not build magnetic concentrating works at the Spurr mine in Michigan the coming summer, but will devote all their efforts to their Eastern works. Mr. Edison realizes that the present prices of ore make it necessary to get all his work down to a minimum of cost and he is constantly improving his present methods to that end.

The willingness of so many producers of raw and finished iron to take contracts with deliveries extending through the year precludes any special improvement in prices in 1893. It promises to be, like its predecessor, a year of exceptionally large consumption, but with prices averaging the lowest on record.

Mr. Simpson Bolland considers the important question of "Core Making" in *The Iron Trade Review* of March 30, which will contain a number of features of interest to the foundry trade.

Some facts of interest about the iron trade of Chicago will be one of the features of next week's issue of *The Iron Trade Review*.

The Coke Outlook Not Brilliant.

The outlook for the coke trade is not flattering. The market seems to drag along in the same old rut week after week. It remains an impossibility for the production to reach over 125,000 tons per week. Ever since the first of the year it has been lagging between 120,000 and 125,000 tons. The operators say that just at present they have too many ovens in the region. Almost one-third of the total number of ovens are out of blast, and every day they are idle adds to the expense of the owners. There is no way of getting over the difficulty, however, as within a comparatively short time the coke trade is liable to assume such proportions as to require the total output of the ovens.

Crushed and foundry coke have held their own in a surprising manner all winter, but with the advent of spring crushed coke will likely fall off some. The one great difficulty in the crushed and foundry trade is to secure means of transportation. Last week box cars were so scarce that orders for crushed and foundry coke could not be filled. Open-tops were plenty for furnace coke. The yards throughout the region are being kept remarkably clean. Furnace coke has advanced from 7½ to 10 cents per ton, and now brings an average price of $1.75. Foundry coke is sold up to quotations; so, also, is crushed coke. The iron trade outlook is brighter. The prophets look for better times this year, and the coke trade will of course share in the prosperity.—[Connellsville Courier.

THE TALBOT PROCESS AT BESSEMER, ALA.

An important matter discussed at the meeting of the Tennessee Coal, Iron & Railroad Co., at New York, last week, was the building of a steel plant at Bessemer, Ala,, using the Talbot process. This process, experimented with first at Chattanooga, as detailed in these columns last August, is controlled by the Metal Refining Co., which has submitted a proposition to the Tennessee Coal, Iron & Railroad Co. This calls for a plant of 300 tons daily capacity.

It is recognized by the furnacemen in the Birmingham district that the supplanting of forge iron, which constitutes the majority of the output of some of them, by the soft steel of the North makes it imperative that they get into the steel market speedily.

The inventor of the Talbot process desiliconizes the ordinary metal by pouring it through a bath of molten basic cinder. He has found that the cinder obtained from one basic open-hearth charge, using the pig and ore process, is sufficient to lower the silicon contents in the pig for the next charge to make it available for the basic open-hearth process. At the same time, there is some reduction of the phosphorus contents and in the carbon. The basic cinder used may contain from 16 to upwards of 30 per cent. of silica, the higher range being limited by the rephosphorization from the cinder. The reaction consists of a swirling motion of the cinder, which is covered with a layer of spongy cinder, through which are scatttered pellets of metal. After the reaction, which lasts about five minutes, a little fluorspar is added to render the cinder liquid and clear. The desiliconizing is carried out on the hearth of the furnace, the metal being tapped and recharged after the cinder has been removed.

It is proposed to take the metal direct from the blast furnace. The records of the analyses of the Birmingham tests are not completed, with the exception of the first heat, but small sample ingots from each heat have been tested with satisfactory results. In all, 20 heats were made at Birmingham, producing about 80 tons of 16-inch ingots.

The results thus far accomplished by the Talbot process give the greatest encouragement for the successful establishment of a steel industry in the Birmingham district.

The Chattanooga *Tradesman* adds the following:

"Some months ago the *Tradesman* published, over the signature of the eminent iron master, A. M. Shook, the details of an improved process for converting iron high in phosphorus, into mild steel or superior wrought iron—whichever the converter wanted—the conversion into high grade wrought iron being something cheaper than the cost of converting into steel. The patentee, Mr. Talbot, in association with Mr. Shook and other capitalists, have been experimenting with this process, using a small steel plant near Birmingham for the purpose, for the 30 days ending March 4. The local press of Birmingham reports the results of the experiments as satisfactory to those immediately interested; though it would seem that the initial stage of full test of the new process was not completed at Birmingham, since it is given out that the experiments will be continued, using the steel plant at Fort Payne.

"The partial tests of the process, made some time ago—we believe in the spring of 1892—convinced Mr. Shook, a very conservative man, close observer, and an iron master of long experience, that it must prove a great success, in cheapening the production of mild steel and finer wrought iron, as compared to the cost of the basic process.

"Nothing could so benefit the Southern iron trade as cheap and reliable conversion of our phosphorus irons into fine, soft iron, or into mild steel—a process that eliminated the necessity for the use of wrought scrap in the converter. This last has been the chief obstacle to the success of the basic process in the Southern iron region. Scrap, owing to the paucity of wrought iron mills and cognate concerns, has always been scarce in the South, and therefore dear; whereas, in the Pittsburg, Cleveland and Chicago districts, it has, for years, been abundant and cheap. If we are, at any time in the near future, to compete successfully with the North as a steel maker, we must reach the achievement through a means of getting rid of the phosphorus in our iron, by the process itself, without the aid of wrought scrap."

Commenting on the situation that confronts Southern furnacemen, the *Engineering and Mining Journal* says:

"It is to some basic process that they must look for the outlet to an over-crowded pig iron market, to agricultural machinery, nails, wire, cotton hoops, boiler plate and roofing, not to the blast furnace exclusively—to chops, not to pig. The development now in progress on the Mesabi range will open some eyes that are now persistently closed to the possibilities of districts other than their own, and our Southern neighbors will do well to lay these suggestions to heart. So much for the pig iron now produced from native ores. But there is another feature of the case deserving the closest attention, viz., the possibility of importing Bessemer ore from Cuba and manufacturing Bessemer steel at Pensacola and Mobile. The matter is now being investigated by men who have the money and the skill to bring it to a successful termination. The chief difficulty heretofore curtailing the extension of trade between Cuba, for instance, and the Southern States, has been the lack of return cargoes. Vessels bringing in ore have no guarantee of return freight, and vessels carrying out coal are in the same predicament. But this operates less and less each year. The Export Coal Co., of Alabama, is now taking to Cuba about 100,000 tons of coal per year, and if these vessels were to return with iron ore the amount so imported would represent about 60,000 tons of pig iron per annum, or 10,000 tons less than the capacity of the Woodward Iron Co., Alabama. The Maryland Steel Co. has an annual capacity of 400,000 tons of pig iron, and requires not less than 650,000 tons of ore, all of which it now imports from Spain, Africa and Cuba.

"The most favorable outlook for the manufacture of Bessemer steel in the South is in connection with the importation of high grade Bessemer ores, and the utilization of them at deep water. A word to the wise *used* to be sufficient."

Another Indiana Gas Belt Project.

A Muncie, Ind., dispatch says that Senator Calvin S. Brice is at the head of an important Indiana gas belt scheme. An option has been taken on several hundred acres of valuable natural gas lands in Delaware county. The dispatch adds: "Other gentlemen interested are the Messrs. Jay, well-known grain merchants of Findlay, O.; Mr. Harris, of Kenton, and Mr. Huffman, of St. Mary's, O. The land is located 10 miles west of Muncie, on the line of the Lake Erie & Western. The company has 10 big manufacturing concerns, one of which is a mammoth strawboard works. They propose to establish the factories and the people will come, and a great city will at once grow up. The new town will likely be known as Brice City, and will replace the new town of Ingalls, recently established by President Ingalls, of the Big Four road, located on his line near Indianapolis."

Vanderbilts after the Youngstown Mills.

The statement is made that the Vanderbilts are the New York capitalists who had the option which expired last week, on a number of iron plants at Youngstown. A Youngstown dispatch says: "Had the Vanderbilts secured control, it is said, that it was their intention to establish immense car shops in this city for the building of the rolling stock of their extensive system of railroads, and their reason for desiring to make the purchase of the iron plants here was that they considered this the most eligible point reached by their railroad system to which raw material might be transported cheaply, and having the facilities for the production of the required amount of finished product with which to supply the demand in the manufacture of their railroad necessities." Some of the concerns in the proposed deal will not be willing to renew the option.

THE Canton (O.) Steel Roofing Co. are rapidly completing their new plant and expect to get into it the latter part of April. At present they are occupying two rented buildings and though they are at great inconvenience, have not failed to fill promptly every order received since their plant was destroyed by fire last December.

THE Cleveland Mechanical Stoker & Engineering Co., Cleveland, O., has been incorporated to manufacture and sell mechanical stokers, engines, etc. The capital is $25,000. Alfred G. Hathaway, E. J. Leighton, Chas Hathaway, Jr., Geo. A. Armington and Harvey D. Goulder are incorporators.

THE WORLD' FAIR BOILER SITUATION.

TO THE EDITOR OF THE IRON TRADE REVIEW:

As there has been considerable misunderstanding and misrepresentation about the litigation in Chicago of the water tube boiler manufacturers, called the "Temporary Association," against the World's Columbian Exposition, for an injunction to prevent the installation of Stirling boilers as an exhibit, we trust you will allow us the privilege of an explanation through your columns.

The Temporary Association is composed of six water tube boiler manufacturers formed for the purpose, apparently, of filling the main boiler room at the World's Fair to the exclusion of other reputable manufacturers and one in particular. Additional space was created which the Stirling Co. applied for, on equal terms with all, but were refused, the engineer in charge stating that the space had been promised to the Babcock & Wilcox Co. The Stirling Co. appealed to the Council of Administration, were sustained, and a contract was entered into. After many ineffectual efforts to change this decision, the Babcock & Wilcox Co. filed a bill for an injunction to shut out the Stirling boilers, thus seeking to create a monoply and throw the gates open for any exhibitor to exclude a competitor. The mastery in chancery decided in favor of the Babcock & Wilcox Co., but Judge Grosscup, of the U. S. District Court, brushed this decision aside, stating that Mr. Sargent, the World's Fair engineer, had no authority to make a verbal agreement. Mr. Sargent expressly testified that he told the Babcock & Wilcox Co. that the promise would first have to be approved by the Council of Administration. As a matter of fact it never was submitted to the council and the Babcock & Wilcox Co. were never advised that it had been approved by that body. The judge holds that the Babcock & Wilcox Co. failed to establish any one of the essential allegations of their bill, and the injunction prayed for was denied, with costs against complainant.

Judge Grosscup emphatically states that the bill is evidently filed for the purpose of excluding Stirling boilers as an exhibit, and the evidence in the case and all circumstances also show very clearly that the object of the Babcock & Wilcox Co. and the other companies was to prevent an exhibit of the Stirling alongside of and in close comparison with the other boilers. We are now, therefore, on record as seeking the closest comparison with all competitors and they are on record as endeavoring by every means in their power to shut us out.

Four Stirling water tube boilers are being erected in the main boiler room of Machinery Hall as rapidly as possible, and when you visit the Fair we trust you will not fail to see them. Thanking you for your kind attention, and trusting we have not exceeded the limit of your patience by this lengthy letter, we remain, Yours truly,

THE STIRLING CO.

Uniform Speed Rather Than Great Speed.

Mr. George Westinghouse summarizes his views of the outcome of the straining for high speeds on railways:

"I am inclined to think that the development of railway travel in the next century along the present lines will be not so much great speed as uniform speed. The ideal speed, I think, will be about 40 miles an hour and steadily maintained from the time of leaving one terminal to the time of the arrival at destination. That will give most satisfactory results. A steady speed of 40 miles an hour would enable a train to run from New York to Chicago in a little over 20 hours, and with greater economy and far less danger. It is my impression, therefore, that railway travel in the next century will take on this development rather than high rates of speed. I am also satisfied that the immense cost of furnishing power for electric railways, which some persons seem to think can secure and maintain a speed of 100 miles an hour or more, will make such a development commercially unprofitable, although there is no doubt that electricity as a motive power for passenger traffic will be extensively used in the next century.

Spathite—A New Iron.

The Spathite Iron Co., which recently purchased the furnace of the North Alabama Furnace, Foundry & Land Co, at Florence, Ala., has put the furnace in first class condition, and will begin the manufacture of iron in the next few days. It will be sold under the name of "Spathite," and, for the present, prices will be made on the basis of Birmingham No. 1 foundry pig. The makers give out this statement: "The product of this furnace will give in the foundry mixture results more nearly akin to that of the Scotch pig than the use of high silicon softeners; it has strength with notable softness, carries scrap in large proportions, and reduces shrinkage to a minimum. What iron was made in testing the quality of this new ore fully sustains the claims made for it. The ore from which this iron is made has not been found elsewhere, and is a new quantity in iron making. These ores have been successfully used as a cupola flux, making the iron cleaner, more fluid, and keeping the cupola in better condition than other fluxes."

Carnegie Company Movements.

The foundry long contemplated in Braddock will be built this spring and in operation by July 1. Hundreds of men will be employed to make all the huge castings and beams used in the Carnegie mills.

The Allegheny Bessemer Steel Works, at Duquesne, is closed for repairs. This plant is controlled by the Carnegie Steel Co. About 800 men will be thrown out of employment. Two 10-ton converters will be put in, the bloom and rail mill are to be enlarged and the plant greatly improved. It will be idle about six weeks.

All the old machinery in the 23 inch and 33-inch mills of the Homestead steel works is being torn out and new machinery to be operated by electricity is being substituted. The new system will do away with the services of many employes known as "hookers."

The Carnegie Steel Co. have ordered a new press for the armor-plate mill at Homestead, an enormous piece of machinery costing over $1,000,000; Whitworth & Co., of Manchester, Eng., are the manufacturers. It will be the largest piece of machinery of the kind in this country, having a capacity of 16,000 tons. It will arrive by the first of next year. The new machinery will give the Carnegie company great advantage in the manufacture of armor-plate, and it is claimed that the company will be able to make the greatest forgings in the world. A plate of 200 tons can be worked in one piece.

The Wheelbarrow Outdone.

A description of a new—but-too-complicated-to-be-understood-by-ordinary-mortals "lever on lever movement" has been exhibited in this city, according to a daily paper. We have not seen it, but we feel that it is unnecessary that we should, since the inventor "shows a complete correlation between his device and that part of the solar system comprised in the sun, the earth and the moon." One of the purposes to which the correlation is to be put is in driving steamships, and it is to produce a third more speed with the same steam power. This is more wonderful than the works of a wheelbarrow.—[American Machinist.

THE Lake Shore Iron Works at Marquette, Mich., expect to ship in the next two months the two big crushers ordered by the Minnesota Iron Co. They will be the heaviest rock crushers ever set up in the Lake Superior region. The sides will weigh sixteen tons each, the jaw casting ten tons and the other pieces will be proportionately heavy. The Marquette *Mining Journal* says of other operations at the Lake Shore Iron Works: "To handle the constantly increasing business of the foundry department of the works the second cupola is being fitted out and will be placed in commission in a few day. Ten tons have been melted every other day for the past three weeks in the cupola now in use. The big hoisting plant building for one of the Negaunee mines is now being assembled and is one of the handsomest jobs ever turned out in Marquette, the big drum being an an especially fine piece of work."

THE Totten & Hogg Iron & Steel Foundry Co., of Pittsburg, Pa., have just closed a contract with Mr. Jas. Callanan, of Des Moines, Ia., president of the Durango Steel & Iron Co., for 700 h. p. improved Aetna engine, one 18-inch muck and bar train complete, a 48 rotary squeezer with gearing for driving it, a heavy muck shear and a 24-inch roll lathe. This machinery is for a new mill which the Durango Steel & Iron Co. are building at Durango, Mex.

PIPE COMBINE PRACTICALLY MADE.

The cast iron pipe founders of the country seem in a fair way to get together in a combine based on an appraisal of all the plants and merging them in a single organization with a capital of from $12,000,000 to $15,000,000. Stock in the new company will be taken by the stockholders in the old, proportioned to their original holdings. The probability that a good dividend could be earned through economies of producing and selling costs made possible by the combination, and through the elimination of throat-cutting competition, has attracted capital outside of the pipe manufacturers, a New York syndicate that stands ready to take a goodly block of the new stock being represented at the last conference held.

The meeting took place in Cincinnati, March 17 and 18, and was presided over by Thos. Howard, of the Shickle, Harrison & Howard Co., St. Louis. The following plants were represented: Addyston Pipe & Steel Co., Addyston, O., and Newport, Ky.; Lake Shore Foundry, Cleveland, O.; South Pittsburg Pipe Works, Tennesse; Radford (Va.) Pipe & Foundry Co., which has works also at Anniston, Ala.; Dennis Long & Co., Louisville, Ky.; Chattanooga Foundry & Pipe Works, at Chattanooga, Tenn., and Bridgeport, Ala.; Shickle, Harrison & Howard Co., St. Louis, and Howard-Harrison Iron Co., Bessemer Ala.; Ohio Pipe Co., Columbus, O.

The same obstacles encountered nearly a year ago when work was begun on the cast iron pipe combination, came up in last week's meeting. The prices at which the various plants should go in, formed a principal bone of contention, and another hitch was on the official list, some of the concerns represented pulling back until they could be assured that their officers would appear in the new list.

O. C. Barber, of Chicago, who is the head of the combination of sprinkler companies formed last Summer; president of the Diamond Match Co., and the American Strawboard Co., prominent in the United States Biscuit Co., in large sewer pipe and other industries, represented New York capitalists at the meeting. Mr. F. M. Atterholt, of Akron, O., was his associate in that capacity. Mr. Barber's name and those of Matthew Addy, of Cincinnati, and C. E. Burke, of Cleveland, have been mentioned in connection with the presidency. Others named in connection with vice presidencies, treasurership and membership on the board of control, are Archer Brown, Cincinnati; Thos. Howard, St. Louis; Briggs Cunningham, Cincinnati; B. F. Houghton, Cincinnati; G. E. Downing, South Pittsburg, Tenn.; E. C. Fuller Columbus; A. F. Callahan, Louisville; F. B. Nichols, Alabama. Another meeting will be held April 10, when it is expected that the organization will be perfected.

Mr. Clarence E. Burke, vice-president of the Lake Shore Foundry, Cleveland, says of the new organization: "We felt that we must combine or else give up business. We can't compete with these Southern institutions. In this part of the country the railroads are against us, and there the railroads assist the pipe manufacturers. The Southern product they call 'poor' and 'cheap' is just as good iron for foundry purposes as that which we use. Some of it is inferior, and some excellent. Labor there can be had for 80 cents and $1 a day. We cannot compete with the cheap negro labor. I would not ask my men to do so; I would not want them to do so. I have been in the Southern country and seen how those negroes live. They are contented and happy, and want nothing more than what those meager earnings give them. One could not make them dissatisfied with their lot if he tried. The same is the case with the 'poor white trash.' Our Northern workmen cannot be asked to take such wages.

"I think the Southern concerns represented in the deal wanted some of the Northern managers to take hold of their business. Instead of causing each other useless expense we can save much money. A dispatch from Cincinnati says that the price of iron pipe will be increased. That is not so. The price need not be advanced. We can let it remain stationary and yet make a profit on cross shipments and freight. The nearest shop to the place ordering the pipe will make the shipment, and thus freight rates will be kept at a minimum. At present we ship pipe to points under the nose of St. Louis, ior instance, and St. Louis ships pipe into Northern Ohio. Excessive freight rates will force the iron pipe manufacturers to shut down unless the new company is formed. Several times during the two years just past we have been on the point of closing our shops.

"The new company will be called the American Pipe & Foundry Co., and will be capitalized under the laws of Illinois. Its capital stock will be $12,000,000. As we have not yet organized, our officers are not chosen. There will be no board of control, but there will be 'shop managers.' The general offices will be in Chicago. I have always been an admirer of the workings of the Standard Oil Co. and expect to see this company adopt some of its methods. A policy of working similar to that of the Standard was introduced at the meeting and found favor.

"Whether all the foundries will be kept in operation will depend altogether on the demand. I have always figured it that there is 32 per cent. more capacity to produce in the country than there is demand for the iron pipe. The values at which the different plants will go into the new company are all arranged, and Eastern capitalists stand ready to put in what additional money is needed, as soon as the new company is formed."

On the Editorial Table.

Camille Flammarion in his marvelous story, "Omega: The End of the World," which begins in the April number of the *Cosmopolitan*, keeps the reader at the highest point of excitement by his vivid description of the alarm and despair excited by the approach of a comet whose collision with the earth had been declared by astronomers inevitable. The description begins at a time when the business of the world has been suspended, and at a great mass meeting held in the Institute of France, we hear the discussion of scientists as to the possibility of a second deluge, the drying up of all the surface water of the globe, or the total destruction of human life by cold, together with all the possible phases of death paralleled by the history of the moon.

The April issue of *Lippincott's* is mainly devoted to Columbus and the Exposition. The complete novel, "Columbus in Love," is by George Alfred Townsend ("Gath"), and narrates feelingly the great discoverer's relations with Beatrix Enriquez. The leading persons of that day in Spain, and some of the chief scenes, are introduced. William Igleheart tells in the same number "What the Publicity Department did for the Columbian Exposition." A portrait of Major Moses P. Handy accompanies this article. Julian Hawthorne attempts "A Description of the Inexpressible,"—the buildings of the Fair; and Frederic M. Bird characterizes "The Religion of 1492" and that of Columbus.

The Chain Belt Co., Park street, Milwaukee, Wis., have issued under date of Jan. 1, 1893, a revised catalogue and price list of their detachable chain belt and sprocket wheels, of which they make more than 300 sizes. They have had more than twenty years' experience in manufacturing, operating, and applying chain belt and sprocket wheels, and are enabled, as a consequence, to present to the trade a full line of goods which combine cheapness with a high state of perfection. They manufacture as well the Levalley magic bolt clipper, which they claim to be the best and cheapest bolt clipper made. It clips off bolts and rivets on a flat surface.

Plates for Inman Liners to Be Made at Home.

Scotch steel makers have been hoping that the steel required for the construction of the two Inman liners in the United States might come to this district, and tenders were sent out to the Messrs. Cramp, on that calculation. Cablegrams, however, have been received, intimating that the orders for the material have been placed with the home producers.—[Ryland's Iron Trade Circular.

It is not generally known that there is a paragraph in our present tariff, first adopted in tariff legislation about twenty years ago, which permits iron and steel to be imported free of duty for use in the construction in American shipyards of vessels to be employed in foreign trade, such as vessels, for instance, as those to be built by the Cramps for the International Navigation Co. That the Messrs. Cramp and the International Navigation Co., with this provision in their favor, should have decided that all the steel required for the new vessels shall be made in American works is a fact that is highly creditable to their patriotism and to their business sagacity. —[Bulletin.

AMONG THE IRON MINES.

Iron Mining Stocks:—

The following quotations of active iron stocks are furnished by H. C. Deming, investment broker, 222 Bank street, Cleveland:

	Par.	Bid.	Asked.
Aurora Iron Co.	$ 25	$ 7.50	$ 8.00
Metropolitan Land & Iron Co., "Norrie"	100	.....	70.00
Lake Superior Iron Co.	25	24.00	26.00
Cleveland-Cliffs Co.	100	48.00	52.00
Minnesota Iron Co.	100	65 00	66.00
Chandler Iron Co.	25	38.00	41.00
Mountain Iron Co., (Mesabi Range)	100	95.00	105.00
Mesabi Mountain Iron Co., "	100	26.00	30.00
Biwabik Mountain Iron Co., "	100	40.00	45.00
New England Iron Co., "	100	8.00	10.00
Cincinnati Iron Co., "	25	2.75	3.00
Great Northern Iron Co.. "	100	9.00	11.00

Gogebic Range:—

An Ironwood, Mich., special says: "Norrie mine, which recently laid off the night shift of 500 men, will probably resume operations with full force before April 1. Supt. Curry is dividing work among the miners so as to give all some work, and advises them to remain here, as the mine will probably start a second shift in a short time.'

Mesabi Range:—

Messrs. Sellers & Parker have been pushing work on their properties in Sec. 6, 57-20. They have two pits in ore. The last assays made the following showing: 18 feet ochre, 57.88 in iron; four feet bottom ore, 64.27 in iron; four feet deeper, obtained by driving down an inch pipe, drawing up and cutting off six inches of the pipe, 63.42 in iron. No phosphorus determinations as yet, but those made in the other pit indicated good Bessemer.

J. Wesley Pullman, of Philadelphia, has been on the new range recently with a view to possible investment.

A bill is about to be introduced in the Minnesota legislature providing that where ore mined from State school lands is converted into pig iron or other merchantable form within the State, the royalty paid the State shall be reduced from 30 cents to 10 cents. This means 20 cents per ton bonus for the building up of a blast furnace industry in Minnesota.

Menominee Range:—

The Chapin now has 200,000 tons of ore on stock pile, says the Iron Mountain *Range Tribune*, and is increasing this pile at the rate of 2,000 tons a day. There will be no reduction of force and a larger output than that of last year is promised.

The water is now below the thirteenth level at the Hamilton and the boilers need to be operated but a few hours a day to preserve that stage. Drifting has begun in the direction of Hamilton, No. 1; this will require a long time for its completion. The drift will be 21 feet at the mouth and gradually taper down to 12 feet. About sixty men will be required on the work.

Visits to the Chapin, the Ludington and Hamilton mines on Thursday forenoon, March 23; to the Aragon, Curry, West Vulcan and East Vulcan mines, Thursday afternoon, and to the hydraulic compressor works and the Pewabic mine Friday morning, are included in the programme for the meeting of Lake Superior mining men at Iron Mountain, March 22-24. Papers are announced by Dr. Nelson P. Hulst, of Milwaukee, on "The Geology of the Menominee Range East of the Menominee River," and on "Soft Ore Mining," by Mr. Per Larson, of Norway, Mich.

Vermilion Range:—

Gun Flint District: Great activity has been going on for the last six or seven months in the northeastern part of Minnesota. Excellent iron ore in large quantities was found here years ago, but nothing could be done with it on account of lack of transportation facilities. Early last year, Mr. K. Kortgaard, president of the Minneapolis State Bank, and other capitalists succeeded in making certain arrangements with the Port Arthur, Duluth & Western Railroad, in consequence of which the road was extended to the Canadian frontier, and a new company built an extension into Cook County, Minn. The present terminal is on Sec. 29, township 65, range 4 west, making the railroad distance to deep water at Port Arthur about 95 miles. The railroad companies have granted the Kortgaard-Paulson syndicate very favorable conditions for handling the ore, and the Canadian government very promptly granted facilities for shipping through the province in bond. Ore can thus be shipped to Cleveland or any other Lake port direct from the Gun Flint district on terms equal to any that Duluth or Two Harbors can afford. The Gun Flint Lake Iron Co., a corporation controlled by John Paulson, K. Kortgaard and some Chicago capitalists, owns about six miles on the iron range, the entire length of which contains fine Bessemer ore, running all the way from 60 to 68 per cent. iron, low in phosphorus and free from titanium. A town by the name of Gun Flint is now being laid out at the railroad terminus. Mr. Paulson has been superintending a large force of men for the last six months, and is now mining excellent ore on sections 27, 28, 29 and 30. The railroad will be extended to section 30 this Summer.—[Correspondence Engineering and Mining Journal.

Ohio's Mineral Exhibit Going Forward.

R. M. Haseltine, Chief Inspector of Mines, for Ohio, who has personally selected each of the 13 samples of Ohio coal for the exhibit at the World's Columbian Exposition, is gathering them at Columbus preparatory to shipment which will be during the present week. The specimens have been selected with a view of showing the various grades of bituminous coal produced in the State. The largest specimen was taken while sinking the shaft of H. D. Turney & Co., at Congo, in Perry Co., and was loaded on the cars on the 18th. The base of the specimen on the face of the coal measures 5⅓ feet, on the butts four feet seven inches. The face measurement at the top is four feet seven inches and on the butts, 4⅓ feet. It, as well as the others, exhibit the entire thickness of the coal vein when in its natural formation, which in the case of the Congo specimen is 15⅓ feet, and weighs 13½ tons net. Taking the quality and thickness into consideration it is believed to be the finest specimen of bituminous coal ever placed on exhibition. Mr. Haseltine expects to go to Chicago the latter part of the week and superintend the placing of the coal exhibit in position.

The building in which this exhibit is to be has not yet been erected but will consist of Ohio stone and the products of Ohio clays.

Will be a Model Boiler Shop.

Details have not been fully decided as to the new boiler shops the Aultman & Taylor Machinery Co. are to erect at Mansfield, but it will be equipped with the most modern and improved machinery, so as to do work in a first class manner, and at the same time promptly and at a minimum of cost. President J. E. Brown and the foreman of the boiler shops are in the East visiting a number of boiler works and inspecting the latest boiler plant machinery. On their return, plans will be definitely formulated for the building of the addition. The company's boiler orders have been coming in steadily the past winter, and their waste heat boilers have been so satisfactory that they are bringing in new orders. When the new shops are completed this branch of the business will be pushed more than ever, and the probabilities are that the addition will be needed before it can be got ready. The company have just taken a large order for waste heat boilers, at Bellaire, O.

Foundry Iron From Mesabi and Vermilion Ores.

Duluth newspapers note that the foundry iron runs from the West Duluth furnace, made from Cincinnati ore, with an admixture of Zenith, is finding favor with foundrymen in the Northwest. The *News-Tribune* says: "As soon as the Marinette Iron Works have used up a lot of charcoal iron now on hand this pig will be used exclusively by them, and in the cupolas and machine shops of the Duluth Manufacturing Co. it is now being tested carefully. Foreman Wells, of the Marinette foundry, on continued use of this Mesabi pig is more enthusiastic than ever over it, and believes it will easily supplant all other foundry irons in the Northwest. Besides working easily in the cupolas and carrying more scrap than other irons, it works easily in the machine shop and is also very tough and strong."

THE American Tube & Iron Co., of Youngstown, has given notice of a 10 per cent. reduction in wages. The men met and decided to strike, but will effect a compromise on a 5 per cent. reduction.

SHOP AND FOUNDRY.

FOUNDRY IRON AND ALUMINUM.

The subject of aluminum and its alloys with other metals has of late, and is to-day attracting considerable attention. The popular idea seems to be that soon we are to have carriages, cars, bridges, etc., made of aluminum or its alloys. This is erroneous. Scientific men and men well versed in the arts do not entertain such wild ideas. There would be no object in making a bridge of aluminum provided we could get it as cheap as iron, and could work it as readily. Aluminum being about one-third as strong as steel and about one-third as heavy, the structure would have the same weight with three times the bulk.

Pure aluminum is too soft and difficult to work to be of much use. It is used with considerable success in some medical and scientific instruments. It is affected by gases and fumes a very little. Aluminum seems to be peculiarly fitted for cooking utensils, and here a great market for it may be developed, from present indications.

Another use for aluminum, and the one which interests us most in this paper, is the alloying with other metals. Some of these alloys are very valuable while others are not. The copper aluminum alloys are among the valuable ones. These have been well tested by Prof. Thurston, of Cornell University, and Mr. Keen, of the University of Illinois. These alloys have the advantage of being strong, but the disadvantage of being expensive when compared with mild steel. Aluminum in cast iron is another alloy which has been much considered, and some extravagant statements have been made in its favor.

Mr. Keep, superintendent of the Michigan Stove Co., of Detroit, has done some elaborate work in this line, and has come to the conclusion that it is of but little benefit to use aluminum in cast iron. He is convinced, however, that the hards irons will stand more aluminum than the soft irons, and that aluminum possesses the power to a great extent to change combined carbon into graphite.

The writer experimented with commercial aluminum and ordinary foundry iron, to ascertain what effect aluminum added to cast iron in a commercial way would have on the castings.

MAKING THE TEST BARS.

The bars were 18 inches long by 1 inch square, enlarged at the ends to fit the testing machine. The bars were molded in green sand and cast the same as commercial iron, except that they were poured on end to insure sound castings.

The test bars in the table below which show high results were made from Scioto No. 1 pig and scrap iron, half and half. The bars that show low results were made from an Ohio iron. The scrap was selected with care, and run about the same all through. The test bars were made at the middle of heats, ranging from 1,200 to 1,500 pounds each. The furnace used was an 18-inch plain cupola, in the foundry at the Engineering Laboratory of the University of Michigan.

All of the odd numbers in the table represent iron, while the even numbers represent iron with aluminum. Every odd and every even number represents an average of three pieces. The links in the table show that both numbers are from the same ladle of iron.

When test bars were made the furnace was tapped, and some of the iron was taken out and cast into the odd numbers. The rest of the iron was run into a ladle, which had been weighed with a known amount of aluminum at the bottom, to allow the iron to pour over it, thus mixing better than by placing the aluminum in the ladle and stirring it in from the top. When the iron had filled the ladle, it was weighed, and the ladle deducted. The test bars thus made were allowed to cool slowly in order to be soft.

The pieces which were high in aluminum looked more like lead than iron on the outside, the sand peeled off much smoother than from the castings where aluminum was not used.

One thing was very marked about the iron before it was poured. The ladles which had less than one-half of 1 per cent. of aluminum were very fluid; while those with over 1 per cent. were not very fluid. The iron with a small amount of aluminum boiled very freely and cast into fine, sharp work. One can see by the table that for small, fine castings a small per cent. of aluminum is of some benefit; (1) it makes the iron more fluid; (2) it makes the castings smoother and sharper; (3) it makes the castings a little stronger.

CLEANING AND MEASURING.

The pieces were cleaned, but the scale was not removed. The specimens were marked every eight inches, and the cross section at the marks measured. The elongation was noted, but amounted to but little. The reduction of areas at the break was practically nothing.

TESTING.

The testing was done on an Olsen 100,000-pound testing machine, at the engineering laboratory, University of Michigan.

The elastic limit and the ultimate strength were practically the same.

		Number.	Per cent. of Pig iron.	Per cent. of Scrap iron.	Per cent. of Aluminum.	Per cent. o Elongati on	Sectional Dimension.	Ultimate Strength per Square Inch.	Character of Break.
Ohio Iron.	Unknown Pig Iron.	1...	50.	50.	.....	.01	1.040 x 1.018	13,392	Medium.
		2...	49.50	49.50	1.	.....	1.0026x 1.005	8,238	Rather coarse.
		3...	50.	50.	.....	.01	1.024 x 1.011	14,785	Medium.
		4...	49.70	49.70	.60	.....	.991 x 1.010	12,067	Coarse.
		5...	50.	50.	.....	.01	1.004 x .998	14,602	Medium.
		6...	49.80	49.80	.40	.01	.996 x .991	12,670	Medium.
		7...	50.	50.	.....	.02	.982 x .976	15,808	Medium.
		8...	49.85	49.85	.30	.01	.986 x .995	11,663	Rather coarse.
		9...	50.	50.	.....	.03	.998 x 1.000	17,835	Medium fine.
		10...	49.90	49.90	.20	.01	1.003 x .992	12,667	Medium.
		11...	50.	50.	.....	.02	.970 x .983	13,948	Medium.
		12...	49.92	49.98	.16	.02	1.010 x .990	12,320	Medium.
		13...	50.	50.	.....	.02	.996 x 1.003	13,159	Medium.
		14...	49.98	49.98	.4	.01	.998 x 1.004	14,563	Medium.
		15...	50.	50.	.....	.02	1.004 x 1.010	12,940	Medium.
		16...	49.99	49.99	.2	.01	.995 x 1.000	14,820	Medium.
Scioto.		17...	50.	50.	.....	.03	1.040 x 1.025	22,138	Rather fine.
		18...	49.995	49.995	.010	.04	1.030 x 1.030	23,882	Medium.
		19...	50.	50.	.....	.03	1.025 x 1.030	22,064	Rather fine.
		20...	49.998	49.998	.004	.04	1.022 x 1.024	23,370	Medium.
		21...	50.	50.	.....	.02	.999 x 1.024	23,010	Rather fine.
		22...	49.998	49.998	.004	.03	1.040 x .995	22,901	Rather fine.

On examining the table it can readily be seen that if aluminum is to be used at all, it must be in small quantities, as it is more apt to do harm than good. The writer made some experiments on hard iron, but the castings were too poor to make use of, and time would not permit of more work in this line. The writer has drawn the following conclusions from his own experiments and those of others:

The condition of cast iron depends largely on the nature of its carbon. If the iron has too much combined carbon it is apt to be hard and brittle; if it has too much graphite, it is apt to be weak. There is a certain medium point at which we get the greatest strength, therefore aluminum would be beneficial only where the carbon needed freeing. On the other hand, aluminum is detrimental where too much free carbon exists.

We may safely say that aluminum should not be placed in the hands of an ordinary foundryman; but if used at all it must be used in a scientific manner. Aluminum if added at all, to cast iron, should be added during the manufacture of the pig iron at the blast furnace. It is generally the opinion that aluminum helps to make sound castings. I found this to be so when small quantities were used.

One reason, however, for not using aluminum in the foundry is this, it makes the slag very brittle. This slag is apt to break away and get into the mould. Aluminum iron does not unite well when two surfaces come together in a mould. This is another reason for not using it for certain classes of work.

In conclusion I may say, with Mr. Keep, that aluminum is not a safe thing to use in the foundry. Experiments were made with much smaller percentages of aluminum than is shown in the table, with but little change to the castings.—[C. G. Taylor in Age of Steel.

NO MONOPOLY IN MACHINE SHOP BRAINS.

It is probably true that it is not so easy for a man of limited means to make a successful start in a manufacturing business as it was 25 years ago. That is what everybody says, and hence it must be true. Still, if one notes the number of sharp, go-ahead mchinists who have grown up to a business of good proportions during the past ten or twelve years, he will almost believe that the old adage is not applicable to men of that trade. There is less chance for men who do not understand the business they try to start—let it run itself, as it were—but the live, energetic mechanic, who has capital in the way of

brains to work with, the man who in addition to mechanical skill and ability has, or acquires, good business qualities, seems just as likely to get ahead with a small capital now as ever. He will build up a business because he has something to build it on, and the determination to go on. His shop may be small at the start, but there will be all the more energy distributed over a given number of square feet. The growing up—spreading out—is only the natural result of energy confined in too narrow limits.—[American Machinist.

PLAN IN MACHINE SHOPS.

Mr Robert Grimshaw puts forth in *Dixie* some general suggestions on "Plans for Manufacturing Establishments," that are worth reprinting. We extract some salient points:

It would be impossible to formulate definite rules which, in one kind of an establishment, might be laid down for absolutely the best possible arrangement of buildings, original or subsequent; but there are some common sense ideas which may be put on paper, and that should apply to almost every case. The leading principle to be set forth is that the buildings should be so arranged with regard to each other, and each floor should be so laid out, that material flows, as it were, in only one direction, from the time that it enters the establishment in the crudest form in which it is obtained, to the time when it quits it, boxed or otherwise prepared for shipment.

In many machine shops there is but one entrance, through which all raw material (in which I include material that is to be worked on, whether it be pig-iron to go to the foundry or a steam engine to have its cylinder re-bored) must go, and through which, also, all finished products must pass out. The result is that, often times, the door is blocked with heavy work being taken up by the cranes or laid down by them, and the whole establishment must wait for some certain raw material, pending the exit of a job for which no one is in any special hurry; or, *vice versa*, a train, or a monthly steamer, may be missed because the only door is blocked by a car load of pig iron broken down right in the way, and for which iron there is no hurry whatever.

Common sense dictates, and successful experience shows, that in most cases, to have the drawing room near the office is a good plan; that the pattern shop should be near the drawing room, in order that explanations may be had, or minute directions given; that where there is much wrought iron work to be done direct from drawings, the machine shop, as well as the pattern shop, should be near the drawing room; and that, where the character of the work requires the parts to be made separately in one place, and fitted together in another, the machine shop should be in direct line with the passage of the material from the foundry to the erecting shop. Where no erecting shop is necessary, as in the case of a shop which manufactures rather than builds, then the packing and shipping department may follow the machine shop proper in place of the erecting shop. Where the work is of such character as machines, or machine tools, built according to the ideas of the proprietor of the establishment, instead of to order to suit those of the customer, it is usual to make such machines, or machine tools, in batches of from six to twenty, and put them in stock. In such cases, the store-room should come between the erecting shop and the shipping department proper.

In the machine shop itself, where the character of the work can be determined beforehand—as it can be very readily in a shop especially equipped for building pumps, or steam engines, or the like, all of which must pass through a certain order of manipulation, as, first to the heavy boring machines, then to the heavy planers, etc., then to the shapers and next to the drills—the shop may be laid out with a view to a constant advance or circulation of the pieces in only one direction—that is, without reversing on the same track. Of course to travel in a circle, or all around a building without going back on the track, is about as well as going along in a straight line. The main object usually should be not to have one piece, which is going to be worked by a machine, interfere with the progress of another piece which has just undergone the same operation.

J. F. Bailey & Son, of Philadelphia, dealers in iron, who suspended payment when Cofrode & Saylor went into a receiver's hands two weeks ago, have assigned.

MACHINE FOR CUTTING AND SHAPING RODS.

Mr. J. W. R. Johnson, foreman of the pattern department and draughtsman at the Tredegar Iron Works, Richmond, Va., has invented a machine for cutting, pointing and shaping rods. Mr. Johnson has given special attention, for several years, to the designing of formers and dies for cheapening the production of wrought shapes for cars and for other uses. He is the inventor of dies for welding the links made by a machine, also of his design, whereby it is possible to weld a link with three or four blows of a small steam hammer, producing a perfect link without a fin. His latest machine is a universal pin header, with which he will be able to head about 6,000 pins a day, giving any shape of head desired. Mr. Johnson's inventions in this line have developed considerable business in links and pins.

Of the illustrations given herewith, Fig. 1 is a plan view of the machine for cutting, pointing and shaping rods; Fig. 2 is a side elevation. The cross-head A may be driven by pitmen A′, operated by any suitable motor. To the cross-head is secured a reciprocating rolling bar B, which extends through a housing C, mounted on standards C′, on the bed-plate D. The housing is constructed so as to contain rollers *c*, which bear on the upper surface of the reciprocating bar B. The rollers are mounted on a shaft *c*′, against the ends of which bear set screws c^2, which regulate the vertical adjustment of the shafts and rollers.

To the bed plate D, is removably secured a pointing and severing bit E. A similar bit F, is secured to the reiprocating bar B.

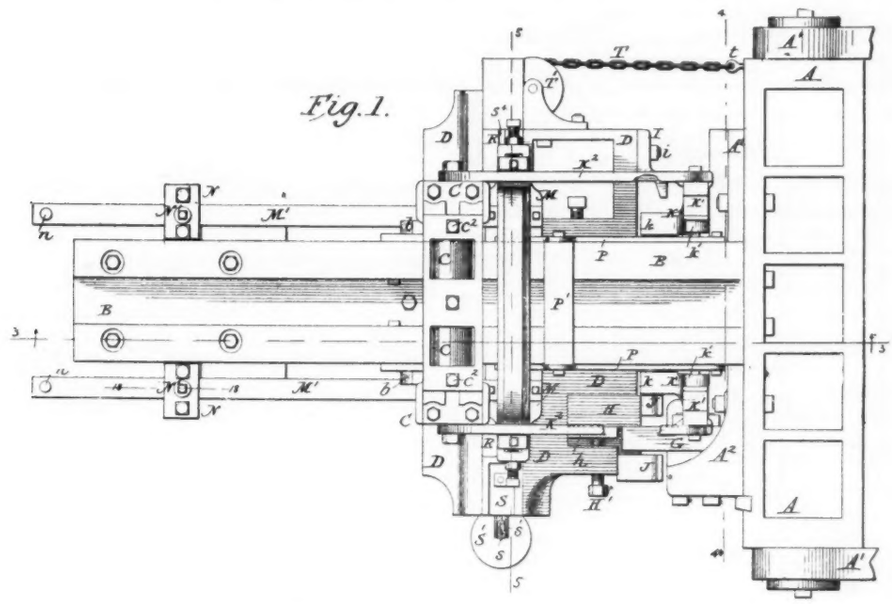
A plate A^2, is secured to the cross-head A, and to this plate is secured a shear block G, which co-operates with a shear block H, secured to the bed plate, to sever the crop ends from the rod, and to cut the rod into proper lengths to form two pins. The shear block H, is held in place by a set screw H′, between which and the base of the block is interposed a bearing plate, *h*. A gauge I, is secured by screws *i* to the bed plate D, and when the rod is fed in, its forward movement is limited by the gauge, which determines the length of the pins to be severed. A series of brackets J, are formed on or secured to the front end of the bed plate, and when the rod is fed in, it rests on these brackets.

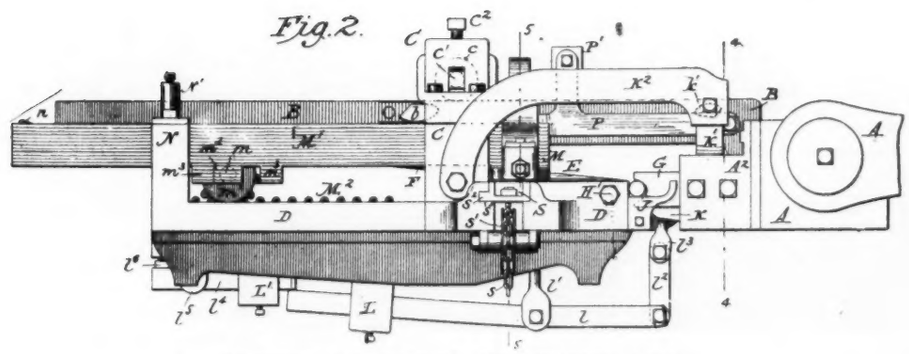
A lifter K, having inwardly-projecting arms or fingers *k*, is carried by hangers K′, secured to the lever arms K^2, pivoted to the standards C′, of the housing C. The levers at their front ends carry inwardly-projecting cam lugs *k*′, adapted to bear against cam lugs *b* on the reciprocating bar B. The lifter is raised and lowered as the bar B reciprocates to carry the rod from the brackets J into the path of the cutting and pointing bits E and F. The lifter is counterbalanced by weights L L′, carried on levers. The lever *l*, which carries the weight L, is pivoted to a hanger *l*′, and to a link l^2, connected at its upper end by another link or knuckle l^3, to the lifter. The weight L′, is carried by a lever l^4, pivoted to a bracket l^5, on the bed plate D. The front end of the lever l^4, bears against the rear end of the lever *l*. The weights are adjustable on the levers, and the upward movement of the rear end of the lever l^4, is limited by an adjustable set screw l^6. The counterbalancing weights return the lifter to its normal position after it has been depressed.

A carrier M is secured to reciprocating bars M′, which carry at their rear ends a shaft *m*, carrying pinions *m*′, gearing with racks m^2, Fig. 2, on the bed plate D, and on the reciprocating bar B. The shaft *m*, is mounted in blocks M^2, which have a slight longitudinal movement between lugs m^3, projecting downwardly from the bars M′. The bars M′, as they reciprocate, move in guides N, on the bed plate D, which are provided with adjustable friction blocks N′, bearing against lugs or projections *n*, on the bars M′. By this construction, as the bar B, reciprocates, motion is imparted to the pinions *m*′, and as these pinions engage with both the reciprocating and the stationary racks M^2, a reciprocating motion will be imparted to the bars M′. As long, however, as the lugs *n*, bear against the friction block N′, the lugs m^3, move towards the blocks m^2, without imparting a reciprocating motion to the bars M′. As the axis of the pinions is half way between the racks, the bars M′, will be moved only half as fast as the bar B, and thus the desired motion is given to the carrier. The carrier, it will be observed, is provided with a groove or recess for the bar from which the

pins are to be formed. When the bar is lifted into the carrier, the carrier is moved forward, causing the bar to traverse the lower or stationary bit, while the upper bit moves forward with the reciprocating rolling bar B. This upper bit, it will be understood, moves twice as fast as the carrier, so that the rod is quickly and easily pointed and severed. The carrier is made in two parts or divisions, to permit the upper and lower bits to operate. After the rod is severed, it is discharged from the carrier by mechanism.

The rod from which the pins are formed is operated upon while it is still hot, as is comes from the rolls. The front end of the rod is first inserted in front of the shear block H, upon the brackets J. The cross head then moves forward and the blocks G and H sever the crop end from the rod. On the next forward stroke, the rod is moved transversely and stopped by the gage I, and is then cut by the blocks G and H, to form a blank, of a proper length to make two coupling pins. It will be understood that two rods may be operated upon at the same time, that is, while one rod is being cut into pin lengths and





MACHINE FOR CUTTING AND SHAPING RODS.

discharged from the machine, the other rod may be put into position for being fed to the bits. By varying the formation of the bits, articles of different shapes may be made.

The principal claim of the inventor is on the combination of a bed plate, a pointing bit mounted thereon, a reciprocating cross head and bar carried by and reciprocating with the cross head, a pointing bit mounted thereon, a housing, pressure rollers mounted therein and bearing on the reciprocating bar, a shear block mounted on the bed plate, and a shear block mounted on the cross head.

Successful Tests of the Brightman Stoker.

Two months ago there was reprinted in these columns, from the Pittsburg *Dispatch*, a communication from Duquesne, Pa., giving the results of test made in a manufactory there, contrasting mechanical stoking and hand firing. The summary of the tests is expressed in the statement that 149 h. p. was developed from mechanical stoking, on the basis of the evaporation of 30 pounds of water per hour from 100 degrees into dry steam at 70 pounds pressure, against 96 h. p. from hand firing. We are just in receipt of a statement from the Brightman Stoker Co., that the tests referred to were made at the Howard Plate Glass Co.'s works at Duquesne, and that the stoker referred to was the Brightman. We quote:

"In October, 1891, the Howard Plate Glass Co. had in use 20 horizontal tubular boilers, each 60 inches in diameter by 16 feet long, having 44 four-inch tubes in each, all provided with flat grates and furnaces of the usual construction for such boilers. At the date mentioned above they purchased and erected under four of these boilers, four Brightman mechanical stokers and put them in operation, using them constantly, night and day, for a period of nine months following. During this period the tests above mentioned, and other tests, were made by them for the purpose of determining for themselves all questions of economy, capacity and durability of the Stoker in comparison with the flat grate furnaces in use under the other 16 boiler, having precisely similar accessories.

"The results of these tests satisfied them that Brightman stokers were valuable, and on July 8, 1892, they sent us their order for 16 more stokers, all of which are now in operation. Such facts as these—and scores of similar experiences can be mentioned—should convince manufacturers and others who depend on bituminous coal for steam making that it is worth while to examine into their own method of burning coal. In most cases they will find that by failing to avail themselves of improved steam making furnaces solely on account of their cost, they are saving at the spigot and wasting at the bung-hole. The efficiency of the Brightman Stoker over any flat grate furnace is as thoroughly and conclusively established as that of any other machine ever invented."

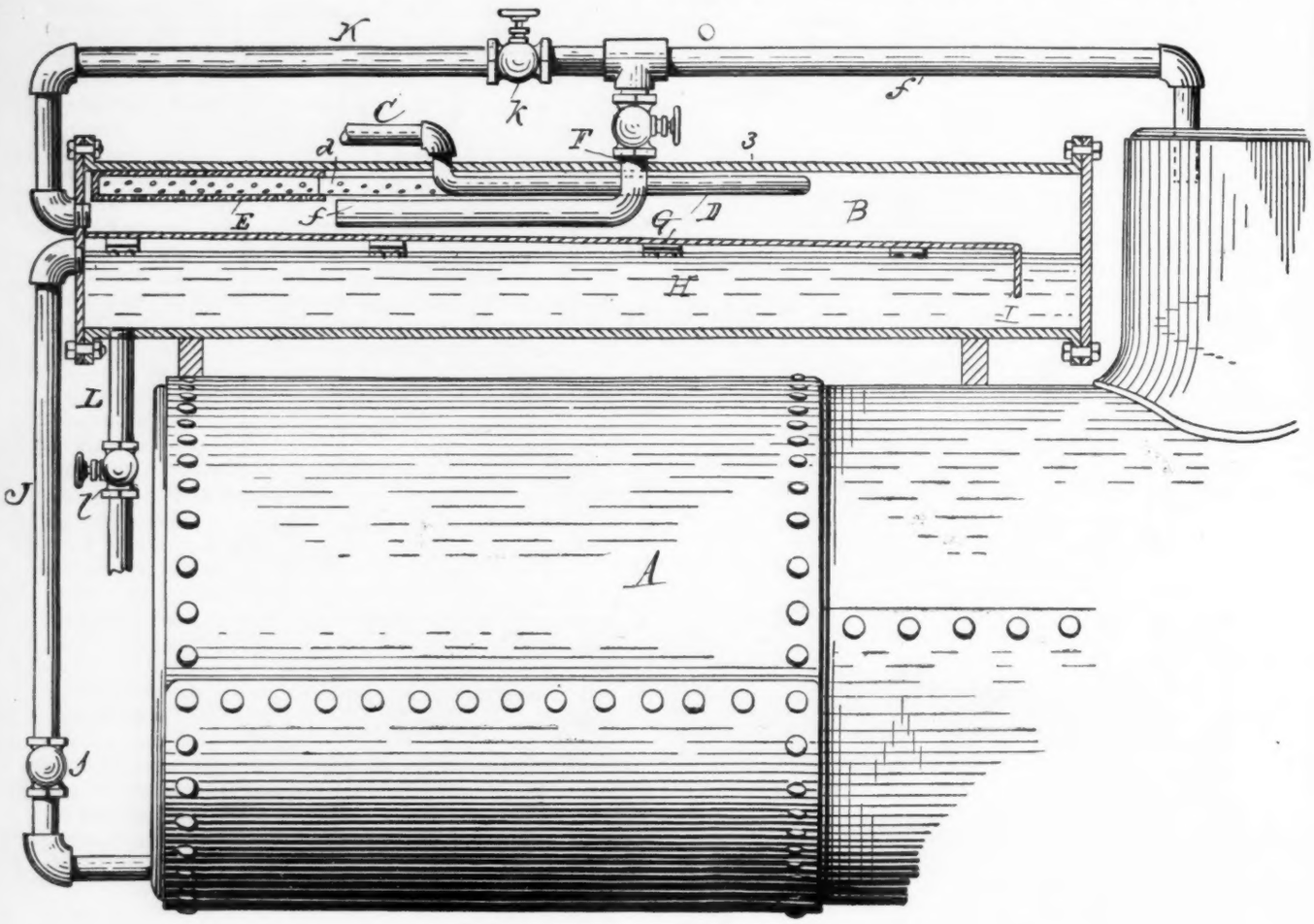
MR. H. P. HAMILTON, for a number of years superintendent for Dewstoe & Schneider, of Cleveland, has connected himself with the Capitol Heater Co., of Detroit. He will represent that company in Northeastern Ohio, Northwestern Pennsylvania and Western New York, selling the Capital and Bolton hot water heaters.

PEREW FEED WATER HEATER AND PURIFIER.

Frank G. Perew, of Buffalo, N. Y., has recently obtained a patent on the Perew feed water heater and purifier, an illustration of which is given herewith. The object of Mr. Perew's invention, as of other feed water boilers and purifiers, is to separate all mineral and earthy matter (such as carbonates of lime, magnesia and iron, chlorides of potassium, magnesia and calcium, and sulphates of lime, silica, soda and potash) from feed water, by raising the feed water to steam heat and confining the escaping sediment so that it can readily be blown out and only the pure water be fed into the boiler. To prevent scale or incrustation upon the flues and shell of boiler it is necessary that the mineral matter be entirely separated from feed water before it is fed into the boiler, and this is only accomplished by raising the feed-water to from 290° to 300° Fahrenheit by spraying the water into live steam taken from the dome of the boiler. Exhaust steam will not heat the water beyond 212° Fahrenheit.

In the normal operation of this purifier the valve of the steam delivery pipe F is open, and the valves of the cleaner pipe K and the blow-off pipe L are closed. The impure feed water entering through supply pipe C (which is connected with pump, hot well, or other available source), traverses the coil D, whereby it is heated to a comparatively high degree. It then passes into spray pipe or jet E, and as it issues from perforations of the latter it encounters the steam delivered by steam pipe F, whereby its temperature is increased instantly to steam heat. The heated feed water descends from spray pipe E upon the head of the sloping diaphragm or partition G, and flowing over the latter enters the settling chamber H. In passing through the settling chamber H the impurities are precipitated, while the purified water passes onward to the boiler through the feed-pipe J. As the agitation of the water entering the front end of settling chamber is checked by depending wall I of the diaphragm or partitition (thus insuring no current through heating chamber), the sediment has an opportunity to settle, and after being deposited upon the bottom of the settling chamber is undisturbed by the comparatively quiet flow of the water through the chamber. By discharging the partially-heated feed-water into the extreme rear end of the heating chamber B, and delivering the steam rearwardly against it in the opposite direction from which it flows over the diaphragm or partition, the passage of the water is retarded and is kept under the influence of the steam for a correspondingly longer period, thus insuring the heating of the feed water to the highest temperature possible before it reaches the boiler.

When it becomes necessary to blow off sediment deposited upon diaphragm G, and the bottom of settling chamber H, the valve of the steam supply pipe F is closed, and those of the cleaner pipe K, and the blow-off pipe L, are opened. The steam now passes through cleaner pipe K into the portion of heating chamber above the diaphragm or partition G, thence forwardly through this chamber and into the front portion of settling chamber, and then rearwardly through the latter, whence it escapes through the blow off pipe L. The steam entering the rear end of the heating chamber sweeps over the diaphragm, carries along any impurities deposited upon it, and forces them through the settling chamber together with any sediment lodging upon the bottom of the latter chamber, and finally discharges all sediment through blow-off pipe L, thus insuring a direct blow-off. It not being necessary to shut off feed supply pipe C, the water is carried along with the steam, thus washing the purifier at the same time.



PEREW FEED WATER HEATER AND PURIFIER.

By drawing off the feed-water from settling chamber at or near its surface, the water is obtained in its purest state, and by connecting the blow-off pipe L with the extreme bottom of the settling chamber the thorough removal of all the deposited sediment is insured.

In the accompanying illustration the feed water heater and purifier is shown on a larger scale compared with the boiler, than the actual, the inventor making his drawings in that way for purposes of ready explanation. The Perew purifier is adapted particularly to stationary and locomotive boilers. A saving of fuel has been demonstrated, ranging as high as 30 per cent. in some instances, it is claimed. Mr. Perew asserts that the temperature of 280° to 300°, required to separate lime,

magnesia, etc., is attained by his device, but is not reached by exhaust steam.

Books Received.

Logarithmic Tables. Fourth edition. By Prof. George W. Jones, of Cornell University. 8vo, cloth, $1. Address the author, Ithaca, N. Y. The compiler of this work has aimed at accuracy, rapid and easy use, and to avoid straining the eyes. This last is an important consideration. The pages are large and open and the type clear and so varied that each figure stands out perfectly. Nine pages of explanations of the tables are given, to begin with. A table of constants and three tables of weights and measures, introduced in the volume, will be found particularly valuable in chemistry, engineering, physics and electricity. The arrangement of the tables is excellent and their clearness a feature that will be thoroughly appreciated in the using.

Applied Mechanics; an Elementary Manual. By Andrew Jamieson, M. Inst. C. E., Professor of Engineering in the Glasgow and West of Scotland Technical College. London: Chas. Griffin & Co., Ltd. This is a 12mo of 270 pages, well printed and copiously illustrated. It is divided into four parts: 1. Forces in equilibrium and the principle of movements and of work as applied to simple machines, such as levers, pulleys, cranes, inclined planes, belt and wheel gearing, screws and screw gearing. 2. Hydraulics and hydraulic machines. 3. Laws of motion, velocity, acceleration, centrifugal force, balancing fast speed machinery, and accumulated work. 4. Properties and strength of materials, chains, shafts and beams. These subjects are discussed in 24 lectures, all reinforced by illustrations and mathematical demonstrations. All the complicated machines in use in the machine shop are illustrated and the applications of the principles of simple machines pointed out. The work admirably covers the field which it essays to fill.

The Locomotive, vol. 13, New Series, 1892. We are in receipt of this cloth-bound volume of the very creditable monthly, devoted to boilers and boiler practice, and published by the Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn. The twelve numbers make a total of 200 pages, and there is added an index.

Civil Engineers' Club, of Cleveland.

The annual meeting of the Civil Engineers' Club, of Cleveland, was held March 14th, with President Rice in the chair. The annual reports of the secretary, treasurer and librarian were read. For the Programme committee, Mr. W. R. Warner read a report on "The Progress of Mechanical Engineering During the Past Year," and Prof. E. P. Roberts read a similar report on "The Progress of Electrical Engineering." W. T. White, F. J. Falding, N. B. Dare and J. B. Davis were elected active members, and W. W. La Chance and J. W. Willard, associate members. The following officers were elected to serve during the coming year: President, A. H. Porter; vice-president, C. S. Howe; secretary, F. C. Osborn; treasurer, C. P. Leland; librarian, C. H. Benjamin; first director, C. W. Wason; second director, James Ritchie. The paper of the evening was the annual address of the President on the subject, "The Mission of a Local Civil Engineers' Society." Chas. S. Howe, secretary.

A YOUNGSTOWN mill correspondent writes to a labor paper: "Puddling appears on the wane in the lower mills of the Union Iron & Steel Co. Two puddling furnaces have been pulled down in No. 1 mill and a furnace erected in their stead for the heating of old rails, which are 'broken down' through specially grooved rolls into billets, while idle puddlers jealously look on, and must pronounce it a success. The stock of muck bars on hand is not great considering, the capacity of the many finishing mills here, but the stock of old rails lately piled here exceeds all I ever saw in one pile. One would think that all the old rails this side of the Rocky mountains were dumped in this yard."

THE Bucyrus Steam Shovel & Dredge Co., of Bucyrus, O., have been so pressed with contracts that they have been unable to take the time to remove their machinery to the new South Milwaukee shops. It is the intention of the company to add some new lines to their specialties after they get started in the new plant.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Decatur, Ill.—John A. Brown Novelty Co.; capital, $18,000; to manufacture hardware specialties, and stamped goods; incorporators: John. A Brown, Lewis S. Bonbrake, James L. Thayer.

Batavia, N. Y.—The Batavia Pedal Co.; capital, $40,000; for the manufacture and sale of bicycles, tools, etc.; incorporators: Leon W. Hammond, Thos. H. Cooley, Chas. H. Caldwell, all of Batavia, N. Y.

Chicago, Ill.—Globe Storage Battery Co.; capital, $1,000,000; to manufacture, work and sell electric storage batteries, apparatus, machines, etc.; incorporators: J. H. Wheeler, Sigmund Kapy, Louis Dumas.

Buffalo, N. Y.—Eureka Emery Wheel Co.; capital, $25,000; for the manufacture and sale of hardware supplies, etc.; incorporators: Michael Reisch, 178 Sycamore street; D. Paul Hughes, 64 Ashland avenue; Wm. Macombe, 24 Anderson Place, all of Buffalo, N. Y.

Utica, N. Y.—Utica Cycle Club; capital, $5,000; for the purchase, manufacture and sale of cycles, bicycles, etc., tents, novelties, etc.; incorporators: J. Holland Rudd, Walter C. Rix, Fred L. Fay, all of Ilion, N. Y.

New York City, N. Y.—Metropolitan Magneto Fire Alarm Co.; capital, $250,000; for the manufacture of electrical apparatus; incorporators: Frederick Martin, Henry B. Lytle, Harry W. Martin, all of New York City, N. Y.

Chicago, Ill.—Campbell & Ansley; capital, $20,000; for general contractors to build railroads, buildings, canals, public and private enterprises; incorporators: Daniel H. Campbell, Oscar E. Ansley, Almon W. Bulkley.

East St. Louis, Ill.—United States Automatic Sprinkler Co.; capital, $500,000; to manufacture and sell automatic sprinklers and appliances for extinguishing fires; incorporators: Henry T. Kent, Geo. M. Myers, Geo. S. McGrew.

Warren, Pa.—Warren Table Works; capital, $20,000; to manufacture tables, stands, desks, chairs and other similar articles from wood, iron and other materials; incorporators: W. M. Creal, Samuel Peterson, F. M. Knapp.

New York City, N. Y.—James Curran Mfg. Co.; capital, $100,000; for the manufacture and sale of steam and hot water heating and ventilating apparatus; incorporators: James Curran, 353 W. 51st street; Paul Curran, James F. O'Keefe, both of 512 W. 36th street, all of New York City, N. Y.

Columbus, O.—The Automatic Check-rein Co.; capital, $10,000; for manufacturing and vending self-acting check-reins and check-rein hooks, etc.; incorporators: Geo. H. Holliday, M. Halloran, S. V. Lynd, M. G. Clay, J. A. Turley.

Philadelphia, Pa.—West Side Traction Co.; capital, $10,000; for the construction and operation of motors and cables or other machinery for supplying motor power to passenger railways; incorporators: Clifford Pemberton, Jr., Thos. G. Hunter Elbridge E. Nock.

Brooklyn, N. Y.—The American Automatic Knife & Novelty Co.; capital, $10,000; for the manufacture of new and patented articles; incorporators: Alfred Bernheim, K. Bernheim, both of 176 Graham avenue, Brooklyn, N. Y.; Albert Weck, 25 Delancy street, New York City, N. Y.

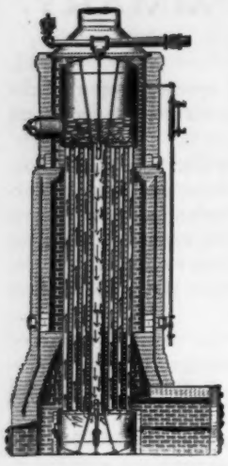
New York, N. Y.—National Light & Construction Co. (incorporated in W. Va.); capital, $200,000; for buying and selling gas and other patents, also for manufacturing gas and electricity; incorporators: Geo. W. Clark, Shadyside, N. J.; Geo. B. Stoutenburg, C. F. Hunt, B. F. Armstrong, Brooklyn, N. Y.

New York, City, N. Y.—The Excelsior Aluminum Manganese Bronze Co., of New York; capital, $10,000; for the manufacture of aluminum manganese bronze; incorporators: Geo. E. Weed, foot of 9th street, E. River, N. Y.; Geo. V. Sloat, Pier 26, N. River, N. Y.; James Gregory, 106 Cannon street, New York City, N. Y.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

At Milwaukee, the Irvin Stafford Mfg. Co., just incorporated, will engage in the manufacture of hydraulic and pneumatic



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EVERY CLASS OF SPECIAL SHAPES AND SIZES.

ALL KINDS OF

Foundry Supplies.

FACINGS, BLACKINGS AND MOULDING SANDS

Of All Kinds.

machinery. About 50 men will be employed and operations will begin May, 1.

Ground has been broken at Escanaba, Mich., for the machine shop of the Escanaba Iron Works. The foundry will be built later.

The Eureka Iron Works, at Wyandotte, Mich., will be enlarged shortly, a press dispatch says, by a new company with $1,000,000 capital.

Wm. E. Campbell, Edward W. Mullikin and John S. Hoover, of Newport, Ky., have incorporated the Joseph Sharp Belting & Supply Co., to manufacture belting; capital, $100,000.

The Illinois Safety Heating Co., of St. Charles, Ill. expect to be ready to fill orders in 30 days. They will manufacture a boiler designed for house warming with hot water, with gasoline for heating the same. A portion of the works is yet to be completed. The company will require belting, blower, drills, files and lathes.

The Milan Canning & Preserving Co., at Milan, Ill., will purchase a 100 h. p. boiler and a 25 h. p. engine, conveying machinery, belting, pipes and fittings, pulleys and shafting; also material for the following metal side and roof buildings: One of two stories, 50x175 feet; one of two stories, 40x110 feet, with L 45x75; one of one story, 30x75 feet.

The Penn Tack Co., of Norristown, Pa., manufacturers of tacks, nails, brads, etc., begin the filling of orders March 15. They will be in the market for emery wheels, and for soft steel plate No. 11 to No. 22 Stubbs wire gauge; 6 to 10 carbon, in car load lots. The plates wanted will vary from 13½ to 15 inches by 32 inches to 36 inches. W. N. Easton is secretary and treasure.

The North Tonawanda (N. Y.) Mfg. Co., incorporated to manufacture Spang pressure blowers and exhausters and special machinery, are at work on their plant, which will consist of a machine shop 40x80 feet and a foundry 40x60 feet, and expect to complete them by June 15. They will purchase a boiler of 50 horse power, an engine of 25 horse power, belting, cupola, drills, drop press, elevator, emery wheels, injectors, files, fire brick and clay, foundry supplies, lathes, gear cutters, pulleys, hangers, shafting, milling machines, wood working machinery and general machine shop supplies. They have orders for their blowers and exhausters from a number of well known firms and will start with business enough to keep them in operation for some time. It is expected that orders can be filled by July. G. A. Spang is manager.

Additions, Enlargements, Removals, Etc.:—

A. & P. Roberts & Co., Pencoyd Iron Works, Pencoyd, Pa., are erecting a new foundry 80x42 feet, one story high.

The Pekin, Ill., Boiler Works have been obliged to double their capacity, and a new building is now being erected.

The Brown & Sharpe Manufacturing Co., of Providence, R. I., are preparing to put up a four-story addition, which will be about 50x200 feet, or over half the length of the present buildings.

Hughes & Patterson, of the Delaware Rolling Mill, Philadelphia, are erecting substantial buildings for producing tin plates, but it will be some months before they can begin the actual manufacture.

Fitzsimons & Co., of Cleveland, have purchased 10 acres at the junction of the Nypano and C. & P. roads and will erect new works. They manufacture shafting. Present quarters are too small for their needs.

The West Virginia & Pittsburg road will build repair shops to cost about $40,000 at Weston, W. Va. The company's roundhouse at that point will also be enlarged. The plans for the new buildings have been prepared.

The Sharon (Pa.) Iron Co.'s large sheet mills, which are being erected at their present works, will be one of the most modern in the country. The building will be 110x45 feet in dimensions. The addition to the firm's business necessitates the extra mill.

The Gautier Steel Co., of Johnstown, Pa., have begun a building 50x290 feet in which they will erect a 14-inch train of rolls for the manufacture of mercantile steel. This new addition will give employment to at least 100 more men. The building and machinery will be ready about June 1.

The Van Wagoner-Williams Co., of Cleveland, manufacturers of hardware specialties, recently purchased additional land, giving them a tract 700 x 312 feet, extending to the Cleveland & Pittsburg tracks. The complete removal of the company's eastern plant to Cleveland requires greater capacity and an addition will be built on the land recently bought.

The Pennsylvania Steel Co. are making fair progress on the new open-hearth plant which they are erecting at Steelton,

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

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Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

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STORES AND WAREHOUSES AT
Boston, Mass.; New York, N. Y.; Philadelphia, Pa., Cincinnati, O.; Chicago, Ill.; Kansas City, Mo.; San Francisco, Cal.; London, Eng.; Paris, France.

DIAMOND W&B DRILL

THE WHITMAN & BARNES MFG. CO.,
Manufacturers of DIAMOND BRAND TWIST DRILLS.

BUY HANGERS, COUPLERS, ETC.,

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although unfavorable weather has interfered somewhat with building operations. The plant will embrace six 35-ton tilting open-hearth furnaces, placed in two rows facing one another. One of the furnaces is approaching completion, the shell of another is nearly finished, while the others are in different stages of advancement.

The Milwaukee Boiler Co. has secured property with a frontage of 305 feet on the river, and will erect one of the largest boiler works in the West. The property is 345 feet deep. The principal stockholders of the company are William and Charles Allis, Edwin Reynolds, W. D. Grey and B. F. Leuzarder. The present plant of the company, on Oregon street, will be removed as soon as new buildings are up. The new shops will cost $165,000.

The new mill the Brown-Bonnell Iron Co., of Youngstown, O., are constructing, with the expectation that it will be finished May 1, consists of an 18-inch bar mill with a 22-inch break down, and a 10-inch guide mill, with a 16-inch break down. They run at right angles with each other. The new mill will be covered with two iron buildings, 220x360 feet, which are connected by a third building, 80x60 feet. About 150 more men will be employed and they will make everything in the way of bar and guide iron. The new plant will be a model one and its novel features are inspected with interest by the iron men of the Valley.

Fires and Accidents:—

The Alice furnace of the Wheeler Iron Co., of Sharpsville, Pa., exploded last week. The furnace, which contained 35 tons, of molten iron, was badly damaged and will take some time to repair it.

The tin ware factory of Natthan, Ingham & Co., at Baltimore Md., burned, with $100,000 loss; insured.

The Diamond pottery of Mountford & Co., at East Liverpool, O., burned last week; loss, $15,000. The fire originated near the engine and the loss is confined largely to the machinery and molds.

General Industrial Notes:—

The Carnegie Co. will build two additional open-hearth furnaces, at Beaver Falls, Pa.

Fire brick works will probably be erected at Lawton, Ky., by the Portsmouth Fire Brick Co.

Phœnix Iron Works, of Ashtabula, O., have built a machine for framing ties for bridges and elevated work.

The Fred J. Myers Mfg. Co., at Covington, Ky., will at once rebuild its architectural iron works, recently burned.

The Wrought Iron Bridge Works, of Canton, O., after being closed for inventory, resume operations with 3,000 tons of work ahead.

The Granite Iron Rolling Mills of the St. Louis Stamping Co. are running full, and the tin mill is hardly able to keep up with the demand.

An attempt is being made to combine the foundries and rolling mills at Knoxville, Tenn., and manufacture water and gas pipe iron columns and structural iron. It is the expecta-

tion that a combination would put the concerns in the way of making money.

The plant of the South Boston Iron Works, at Middlesborough, Ky., will be ready about May 1. Will give employment to about 500 hands.

The new plant Reeves Bros., of Niles, O., are to build at Alliance, O., will be completed and in running order before operations will stop at Niles.

Grace furnace, of the Brier Hill Iron & Coal Co., Youngstown, started on foundry iron some time ago, has changed to Bessemer and is working satisfactorily.

It is not definitely decided whether the furnace of the Brown-Bonnell Iron Co., at Youngstown, recently blown out, will be rebuilt, but the Youngstown *Telegram* says the probabilities are against rebuilding.

Thos. A. Hicks, a creditor and stockholder, secured a receiver, in Philadelphia, for the Cumberland Steel & Tin Plate Co. The company is a New Jersey corporation, but has its plant in Cumberland, Md., and offices in Camden, N. J., and Philadelphia. The liabilities amount to $55,000.

The site of Austin Bros. & Porters' foundry and machine shop, at Tyrone, Pa., burned down on Jan. 31 last, has been bought by A. G. Morris, a pushing Pennsylvania capitalist. The erection of a large foundry, machine shop, pattern shop, storage room, and office, all of brick, will be begun at once.

A Montreal dispatch says that a syndicate of Boston men have obtained an option on the St. John, N. B., rolling mills, and an agent of the syndicate is now in Montreal endeavoring to obtain the four big manufacturing firms of Peck, Benny & Co., Pillow & Hersey, the Montreal Rolling Mill, and Abbott & Sons.

It is said that Shady Valley, a few miles east of Bristol, Tenn., has been bought by a syndicate of English capitalists headed by Sir Walter Oliver. There are 62,000 acres in the tract, containing iron ore and manganese. The purchase price is about $600,000. Furnaces will be established and a railroad built to the mines.

Davis & Co., one of the greatest manufacturing concerns of Great Britain, will establish a plant for the manufacture of galvanized iron ware at or near Chicago. A representative of the firm has been in that city during the past two weeks looking for a location. Hammond will probably be chosen.

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CLEVELAND-CLIFFS IRON CO.,
Cleveland Iron Mining Co.—Iron Cliffs Co.
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IRON & STEEL FOUNDERS
59TH & WALLACE STS. CHICAGO.
BRAKE SHOES-STEEL CASTINGS.

The firm will employ at least 1,000 men. An American company will be formed.

The bill in the Ohio legislature amending incorporation laws so that it will not be necessary for any corporation to pay in all its capital stock before the nominal capital stock can be increased, has become a law. It was introduced at the instance of the Ohio Steel Co., of Youngstown, which desired to increase its stock to $1,000,000.

The Congdon Brake Shoe Co., of Chicago, have recently changed the name of their corporation to The Sargent Co. The change of name entails no change in the management or business, and they will continue, as heretofore, in the manufacture of brake shoes and steel castings. Their office is, as before, at 59th and Wallace streets, Chicago.

The daily papers report the possibility of the removal of the Frontier Iron Works, of Detroit, to Superior, adding that leading stockholders in the Wickes Boiler Works, at Saginaw, will join with the American Steel Barge Co. in building a modern plant for the construction of boilers at the head of the lake. Both the Frontier works and Wickes Bros. have been doing large amounts of work for the barge company in building boilers and machinery for whalebacks.

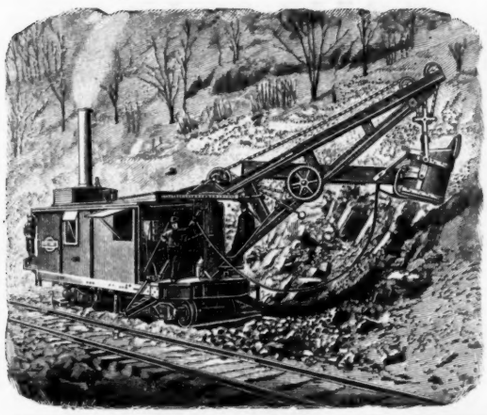
The new buildings of the Mason Air Brake & Signal Co., at Elgin, Ill., on the land recently purchased at that point, will soon be started up. The dimensions of the five buildings are as follows: Main building, 100x300 feet; iron foundry, 30x100 feet; brass foundry 30x60 feet; office 50x50 feet, and power house, 50x75 feet, with four large boilers. In addition there will be four 80 h. p. boilers, and the plant will be lighted by 600 electric lights and heated by steam.

The Gas City (Ind.) Land Co. at its annual meeting last week elected as directors Col. Geo. T. Perkins, F. M. Atterholt, and K. B. Conger, of Akron; Monroe Seiberling, of Kokomo; John F. Miller, of Richmond, Ind.; H. I. Miller, of Louisville, Ky.; and B. Johnson, of Richmond. H. I. Miller was made president, and L. C. Boyd, secretary and treasurer. Gas City was a wheat field, little more than a year ago; the population to-day is put at 3,000. Seven factories are now in operation and others will start the coming season.

Nickel Steel for Boilers.

It has been reported that the Detroit Dry Dock Co., of Detroit, Mich., intended to use nickel steel for boilers. The company have been endeavoring to get information touching on the question of nickel steel and its uses, particularly for boiler purposes. They have canvassed the necessary ground to reach a decision in regard to its use in marine boilers, but thus far have found it very difficult to secure any reliable statistics. They have secured some prices, which have not encouraged them to consider the matter further as the steel at present is too expensive for such use. The reason for considering the matter was a desire to decrease the weight of boilers, or with the same weight of steel, as is now used, to be able to carry higher boiler pressures.—[Railroad Gazette.

Bucyrus Steam Shovel & Dredge Co.,



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PILE DRIVERS WITH EITHER DROP OR STEAM HAMMERS.

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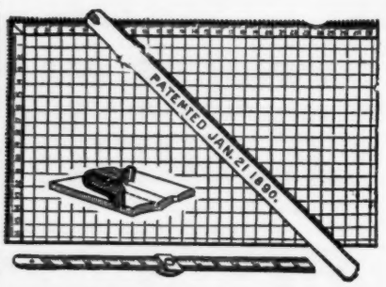

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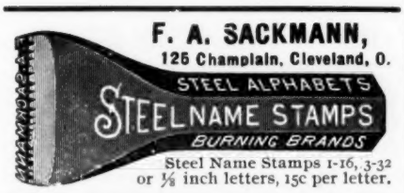

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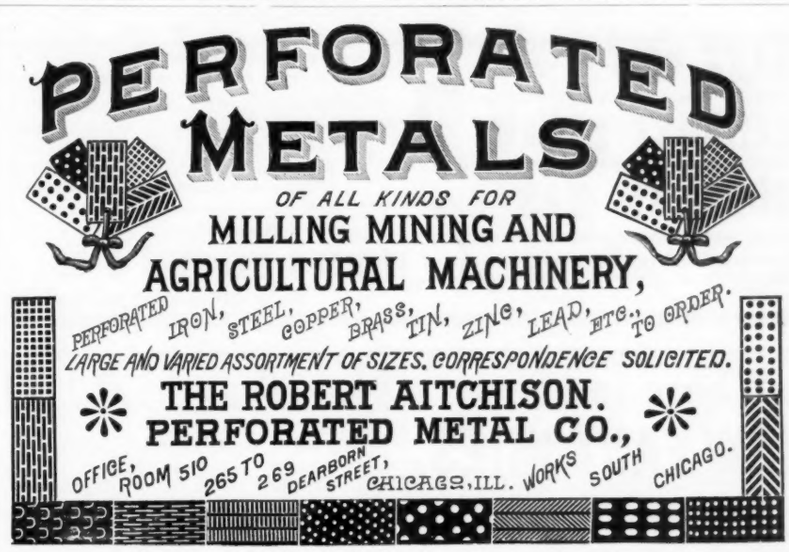
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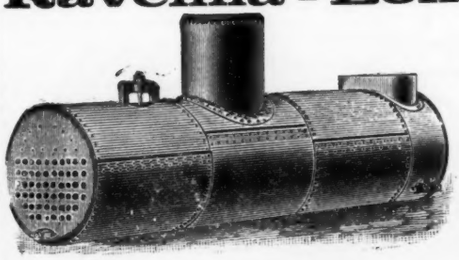

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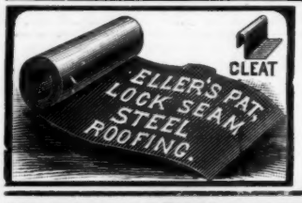

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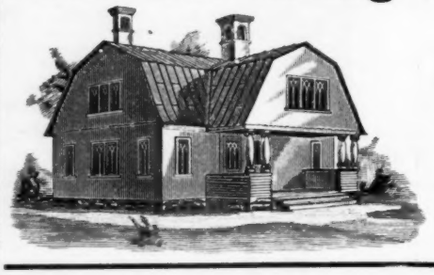

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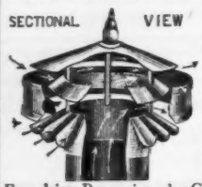

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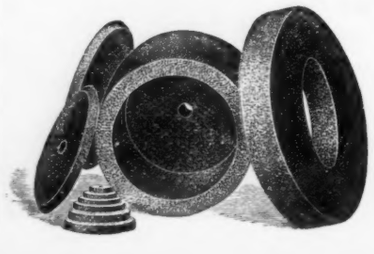

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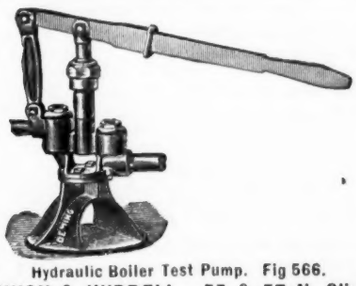

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Garden City Sand Co., Chicago, Ill.
The S. Obermayer Co., Cincinnati, O.

Facings & Blackings—
J. D. Smith Fdy. Supply Co., Cincinnati, O.

Flour Mill Machinery—
The Bradford Mill Co., Cincinnati, O.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.

Foot and Power Lathes—
H. L. Shepard, Cincinnati, O.
Sidney Machine Co., Sidney, O.
Aurora Tool Works, Aurora, Ind.
The Bradford Mill Co., Cincinnati, O.
Hill, Clarke & Co., Chicago, Ill.
Prentiss Tool & Supply Co., Chicago, Ill.
Callender & Patterson, Dayton, O.

Fans—
B. F. Sturtevant Co., Boston, Mass.

Friction Clutch Pulleys—
J. H. & D. Lake Co., Massillon, O.

Flue Cleaners—
E. Rayfield, Chicago, Ill.

Fuel Oil Burners—
Gilbert & Barker Mfg. Co. Springfield, Mass.
C. D. Juvinall & Co., Upper Sandusky, O.

Furnace Grates—
Gordon Hollow Blast Grate Co., Greenville, Mich.

Galvanizers—
H. H. Hodell, Cleveland.

Grindstones—
E. K. Morris & Co., Cincinnati, O.

Glass Boards—
Canton Saw Co., Canton, O.

Graphite Paint—
Jos. Dixon Crucible Co., Jersey City, N. J.
W. W. Lawrence & Co., Pittsburgh, Pa.

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Gordon Hollow Blast Grate Co., Greenville, Mich.

Higgs & Seaman's Gas Valves—
Totten & Hogg Iron and Steel Foundry Co., Pittsburgh, Pa.

Heaters and Purifiers—
Stilwell & Bierce Manufacturing Co., Dayton, O
E. H. Jones & Co., Cleveland.
Warren Webster & Co., Philadelphia, Pa
Brightman Stoker Co., Cleveland, O.

Hack Saws—
Millers Falls Co., New York City.

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The Sam'l C. Tatum Co., Cincinnati, O.

Heavy Hardware—
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The Sam'l C. Tatum Co., Cincinnati, O.
J. W. Foley & Co., Cincinnati, O.
Waukegan Iron & Steel Casting Co, Chicago, Ill.

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B. F. Sturtevant Co., Boston, Mass.

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C. D. Juvinall & Co., Upper Sandusky, O.

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W. W. Lawrence & Co., Pittsburgh, Pa.

Iron Nails and Steel—
Weber & Co., Cincinnati, O.
G. B. Schulte Sons Co., Cincinnati, O.

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Oglebay, Norton & Co., Cleveland.
J. H. Outhwaite & Co., Cleveland.
Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Cleveland Iron Mining Co., Cleveland.
Corrigan, Ives & Co., Cleveland.
B. M. Jones & Co., Boston and New York.
Wilhelm & Co., Harrisburg, Pa.

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Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.

Injectors—
Penberthy Injector Co. Detroit Mich.
Eagle Lubricator Co., Cleveland, O.
American Injector Co., Detroit, Mich.

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Sykes Iron & Steel Roofing Co., Niles, O.
Berger Mfg. Co., Canton, O.
Porter Iron Roofing & Corrugating Co., Cincinnati, O.
Niles Iron & Steel Roofing Co., Niles, O.
Curtis Steel Roofing Co., Niles, O.
J. H. Eller & Co., Canton, O.
N. A. Haldeman & Co., Philadelphia, Pa.

Iron and Steel Wire—
Trenton Iron Co., Trenton, N. J.

Investments—
Frank R. Biedler, Baltimore, Md.
Fidelity & Deposit Co., Baltimore, Md.
Geo. Pemberton, New York.

Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

Improvement Companies—
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Sidney Machine Co., Sidney, O.
H. L. Shepard, Cincinnati, O.
Callender & Patterson, Dayton, O.

Link Belting—
The Jeffrey Mfg. Co., Columbus, O.

Land Companies—
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Lanterns—
Rau Manufacturing Co., Chicago, Ill.

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Lunkenheimer Brass Mfg. Co., Cincinnati, O.

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Cincinnati Milling Machine Co., Cincinnati, O.
Godfrey J. Bremer, Kalamazoo, Mich.
Hill, Clarke & Co., Chicago, Ill.
Callender & Patterson, Dayton, O.
Prentiss Tool & Supply Co., Chicago, Ill.
H. L. Shepard, Agent Cincinnati, O.
Sidney Machine Co., Sidney, O.

Machine Shops—
Toledo Machine & Tool Co., Toledo, O.
Spicer Mfg. Co., New Philadelphia, O.
Harn, Ow & Co., Beaver Falls, Pa.
Godfrey J. Bremer, Kalamazoo, Mich.
Waukegan Iron & Steel Casting Co., Chicago, Ill.

Moulding Sand—
Garden City Sand Co., Chicago, Ill.
J. Downerd & Son Co., Zanesville, O.
The S. Obermayer Co., Cincinnati, O.

Mining Machinery—
Copeland & Bacon, New York.
Lake Shore Iron Works, Marquette, Mich.
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.

Metal Ceilings—
Fred F. Bischoff, Chicago, Ill.

Metal Sawing Machines—
Higley Sawing and Drilling Machine Co., New York City.

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Godfrey J. Bremer, Kalamazoo, Mich.
Brainard Milling Machine Co., Hyde Park, Mass.
Hill, Clarke & Co., Chicago, Ill.
Prentiss Tool & Supply Co., Chicago, Ill.
Callender & Patterson, Dayton, O.

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Rau Manufacturing Co., Chicago, Ill.

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The Golley & Finley Iron Works, Lima, O.

Oil Tanks—
Aultman, Taylor Mfg. Co., Mansfield, O.

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Totten & Hogg Iron and Steel Foundry Co., Pittsburgh, Pa.
Lake Shore Iron Works, Marquette, Mich.

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Deming Co., Salem, O.
Brightman Stoker Co., Cleveland, O.
Henry R. Worthington, New York City.

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W. W. Lawrence & Co., Pittsburg, Pa.
Jos. Dixon Crucible Co., Jersey City, N. J.

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Aitchison Perforated Metal Co., Chicago.

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Hercules Powder Co., Cleveland.

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Godfrey J. Bremer, Kalamazoo, Mich.
Cleveland Stamping & Tool Co., Cleveland, O.

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Aurora Tool Works, Aurora, Ind.
Hill, Clarke & Co., Chicago, Ill.
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Plumbago—
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Pulleys—
Lane & Bodley Co., Cincinnati, O.
J. W. Foley & Co., Cincinnati, O.

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Weston Engine Co., Painted Post, N. Y.

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B. F. Sturtevant Co., Boston, Mass.

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Bradley Fertilizer Co., Boston, Mass.

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland.

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Totten & Hogg Iron and Steel Foundry Co., Pittsburgh, Pa.
Bradley Fertilizer Co., Boston, Mass.
Lake Shore Iron Works, Marquette, Mich.

Rolling Mill Machinery—
The Lloyd-Booth Co., Youngstown, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
General Engineering Co., Harvey, Ill.

Roll Lathes—
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland.
Canton Saw Co., Canton, O.

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Hill, Clarke & Co., Chicago, Ill.
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Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Smokeless Furnaces—
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Brightman Stoker Co., Cleveland, O.
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Cleveland Rolling Mill Co., Cleveland.

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Steel Castings—
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Sargeant & Co., Chicago, Ill.
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The Beckett Smoke Consuming Co., Norwalk, O.
Northwestern Land & Coal Co., Boston, Mass.
Brightman Stoker Co., Cleveland, O.

Stay Bolt Iron—Taylor's—
B. M. Jones & Co., Boston and New York.

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Cleveland Twist Drill Co., Cleveland.
The Whitman & Barnes Mfg. Co., Akron, O.

Torches—
Rau Manufacturing Co., Chicago, Ill.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.

Tanks—
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Ravenna Boiler Works, Ravenna, O.
The Golley & Finley Iron Works, Lima, O.

Tin Plates (Roofing)—
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Tinners' Hardware—
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Tramways—
Trenton Iron Co., Trenton, N. J.

Trucks—
The Spicer Mfg. Co., New Philadelphia, O.

Turret Drills—
A. P. Quint, Hartford, Conn.

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Brightman Stoker Co., Cleveland, O.
B. F. Sturtevant Co., Boston, Mass.

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Watchman's Time Detector.
Cleveland Electrical Mfg. Co., Cleveland, O.
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Milton Mfg. Co., Milton, Pa.

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Radford Pipe & Foundry Co., Cincinnati, O.

Wheelbarrows—
Akron Tool Co., Akron, O.
Kilbourne & Jacobs Mfg. Co., Columbus, O.

Wire Rope—
Trenton Iron Co., Trenton, N. J.

Water Stand Pipes—
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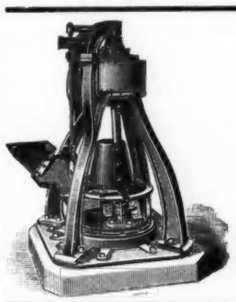

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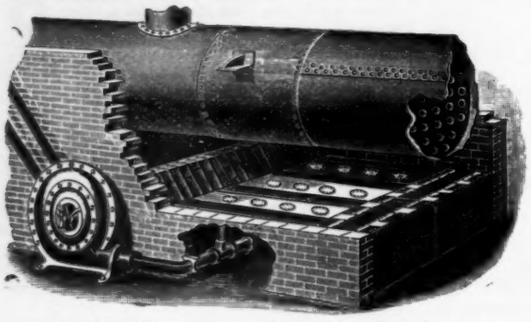

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	PAGE
Aitchison, Rob't Perforated Metal Co	21
Adt, John & Son	19
Akron Belting Co	18
Akron Tool Co., The	31
Aurora Tool Co	21
Aultman Taylor Mfg. Co	16
Aetna Iron & Steel Co	20
American Injector Co	2
Bischoff, F. F. & Co	32
Babcock & Wilcox Co	32
Berger Bros	18
Bradley Fertilizer Co	25
Brightman Stoker Co	18
*Berger Mfg. Co	—
†J. V. Burke	—
Biedler, Frank R	21-29
Bremer, Godfrey J	31
*Beckett Smoke Consuming Co	—
Bucyrus Steam Shovel & Dredge Co	19
Callender & Patterson	31
Canadian Manufacturer	20
*Chicago, Milwaukee & St. Paul Railway Co	—
*Cleveland Desk Co	—
*Cleveland Electrical M'f'g. Co	31
Cleveland City Forge & Iron Co	1
Cleveland Twist Drill Co	32
Cleveland Iron Mining Co	18
Cleveland Stamping & Tool Co	21
Cleveland Rolling Mill Co	25
Condit Fuller Co	18
*Copeland & Bacon	—
Colliau, Victor	30
Cole, J. Wendell	32
Chester Steel Casting Co	23
Corrigan, Ives & Co	18
Canton Saw Co., The	20
*Cincinnati Milling Machine Co	32
Comstock, L. K	31
Correspondence School of Mechanics	20
*Curtis Steel Roofing Co	—
Deming Co	23
Downerd & Son Co., The J	31
Dixon, Jos. Crucible Co	23
Dreier, I	29
Fay & Egan Co., J. A	27
Eclipse Electrotype & Engraving Co	32
*Eagle Lubricator Co	31
Eller & Co., J. H	22
Fleharty, J. H. & Co	30
Fulton Steam Boiler Works & Foundry	23
Garden City Sand Co	16
General Engineering Co	17
Graves Elevator Co	20
Gerlach, Peter & Co	21
*Golley & Finley Iron Works	—
Gilbert & Barker Mfg. Co	26
Gordon Hollow Blast Grate Co	26
Haldeman & Co., N. A	22
Harrington & King Perforating Co	30
Hill, Clarke Co	28
†Higley Sawing & Drilling Machine Co	—
*Hodell, H. H. & Co	19
Hartford Steam Boiler Insp. & Ins. Co	19
Hercules Powder Co	28
Hunt & Co., Robert W	2
*Illinois Central R. R	22
Iron Clad Paint Co	21
Industry File Works	32
Jones & Co., B. M	2
Jones, E. H. & Co	32
Jeffrey Mfg. Co	1
Jenks, James	30
Juvinall & Co., C. D	26
Kilbourne & Jacobs Mfg. Co., The	2
*Lake Shore Iron Works	19
*Leffel Co., W. C	—
*Lake Co., J. H. & D	29
Leofred, A	21
Lloyd Booth Co	27
Lord, G. W	20
Lawrence & Co., W. W	23
*Lunkenheimer Co., The	—
Milton Mfg. Co	20
Magnolia Anti-Friction Metal Co	1
†Millers Falls Co	—
Muncie Land Co	20
*Merchant & Co	22
National Photo-Engraving Co	23
*Nanz & Co., A	—
New Castle Steel Castings Co	1
*Niles Iron & Steel Roofing Co	22
*Northwestern Land & Coal Co	—
Obermayer Co., The S	1
Outhwaite, J. H. & Co	18
Oglebay, Norton & Co	18
Otto Gas Engine Co	30
Pemberton, Geo	30
Pope, E. C	18
Penberthy Injector Co	32
Pollock, Wm. B. & Co	2
Porter Iron Roofing & Corrugating Co	22
Pool, F. J. & H. R	1
Prentiss Tool & Supply Co	21
Quint, A. P	31
Ravenna Boiler Works	21
Rau Manufacturing Co	28
†Rayfield, E	—
Rainey, W. J	2
Roberts Foundry Co., F. E	25
Sargeant & Co	18
Sykes Iron Roofing Co	22
Sackman, F. A	21
Stirling Co	31
Stilwell & Bierce Mfg. Co	2
Shepard, H. L., Agent	32
Skinner Engine Co	30
‖Sharon Fire Brick Works	1
‖Stowe Fuller & Co	1
*Spicer Mfg. Co., The	28
L. Spence & Son	2
‖J. J. Shepard	32
Sidney Machine Co	32
Springfield Emery Wheel Co	22
South Chicago Foundry Co	16
Sturtevant B. F. Co	27
Slocum, J. C	1
Toledo Machine & Tool Co	27
Tod, Wm. & Co	30
Totten & Hogg Iron and Steel Co	19
*Trenton Iron Co	—
Upson Nut Co	30
Union Electrotype Foundry	21
Union Mining Co	17
*Variety Iron Works	—
Van Duzen Gas Engine Co	2
*Warren Webster & Co	22
Waukegan Iron & Steel Casting Co	17
Wells Engine Co	23
Weston Engine Co	1
Whitman & Barnes Mfg. Co	17
*Wilhelm & Co	22
Worthington, Henry R	18

IRON AND STEEL MARKETS.

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Low Phosphorus Bessemer	$5.00@$5.25
No. 1 Specular, Bessemer	4.50@ 5.00
No. 1 Bessemer hematite	3.85@ 4.25
Hematites No. 1 non-Bessemer	3.25
No 1. Specular, Non-Bessemer	$3.75@ 4.15

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$14 00@$14 25
No. 1 Strong Foundry	14 25@ 14 50
No. 2 Strong Foundry	13 25@ 13 50
No. 1 Grey Forge, red short	12 35@ 12 50
No. 2 Gray Forge, neutral	12 25@ 00 00
No. 1 American Scotch	14 50@ 00 00
No. 2 American Scotch	13 50@ 00 00
Lake Superior Charcoal	17 00

PITTSBURGH (reported by A. H. Childs):

No. 1 Foundry	$14 00@$14 25
No. 2 Foundry	13 00@ 13 25
Grey Forge	12 25@ 12 50
White and Mottled	11 50@ 11 75
Warm Blast Charcoal	18 00@ 22 00
Cold Blast Charcoal	22 00@ 27 00
Bessemer	14 00@ 14 25

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$16 50@$17 00
Local Coke Foundry No. 1	13 75@ 14 25
Local Coke Foundry No. 2	13 00@ 13 50
Local Coke Foundry No. 3	13 00@ 13 25
Local Scotch Foundry No. 1	14 00@ 15 00
Local Scotch Foundry No. 2	13 50@ 14 00
Local Scotch Foundry No. 3	13 00@ 13 50
Southern Coke No. 1	14 85@ 15 00
Southern Coke No. 2	13 35@ 13 60
Southern Coke No. 3	12 85@ 13 10
Southern No. 1 Soft	13 35@ 13 60
Southern No. 2 Soft	12 85@ 13 10
Ohio Silveries No. 1	16 50@ 17 00
Ohio Silveries No. 2	16 25@ 16 75
Ohio Strong Softeners No. 1	16 50@ 17 00
Ohio Strong Softeners No. 2	15 50@ 16 00
Tennessee Charcoal	16 50@ 17 00
Alabama Car Wheel	18 85@ 19 85

CINCINNATI (reported by Hyatt, Mathews & Co.):

Southern Coke No. 1, Foundry	$13 25@$13 50
Southern Coke No. 2 and No 1 Soft	12 25@ 12 50
Southern Coke No. 3	11 75@ 12 00
Ohio Soft Stone Coal No. 1	16 00@ 16 50
Mahoning Valley No. 1	15 50@ 16 00
Mahoning Valley No. 2	14 50@ 15 00
Hanging Rock Charcoal No. 1, Fdy	18 25@ 18 50
Hanging Rock Charcoal No. 2, Fdy	17 25@ 17 50
Alabama Charcoal No. 1	16 00@ 16 50
Standard Southern Coke, Grey Forge	11 00@ 11 25
Mottled Neutral Coke	10 75@ 11 00
High Grade Virginia Coke Iron No. 1	16 00@ 16 25
High Grade Virginia Coke Iron No. 2	15 00@ 15 25
Southern Car Wheel Iron	17 00@ 17 50
Lake Superior Car Wheel & Malleable	17 50@ 18 00

BUFFALO (reported by Rogers, Brown & Co.)

Mahoning and Shenango Valley, strong, No. 1 Foundry	$15 50
Mahoning and Shenango Valley, strong, No. 2 Foundry	13 75
Ohio Softener No. 1	14 50
Ohio Softener No. 2	14 00
Jackson Co. Silvery, No. 1	$17 00@ 17 30
Jackson Co. Silvery No. 2	16 30@ 16 80
Lake Superior Charcoal	17 25
Tennessee Charcoal	18 00
Southern Softener No. 1	13 90@ 14 00
Alabama Car Wheel	19 00
Hanging Rock Charcoal	20 50

LOUISVILLE (reported by Hall Bros. & Co.):

Southern Coke No. 1	$13 50@$13 75
Southern Coke No. 2	12 50@ 12 75
Southern Coke No. 3	12 00@ 12 25
Southern Charcoal No. 1	16 00@ 17 00
Southern Charcoal No. 2	15 50@ 16 00
Missouri Charcoal No. 1	17 00@ 17 50
Missouri Charcoal No. 2	16 50@ 17 00
Neutral Coke	11 50@ 12 00
Mottled	11 00@ 11 25
Southern (standard brands)	20 00@ 21 00
Southern (other brands)	18 50@ 19 50
Lake Superior	19 50@ 20 50

ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$13 75@$14 00
Southern Coke No. 2	12 50@ 12 75
Southern Coke No. 3	12 25@ 12 50
Southern Grey Forge	11 50@ 11 75
Southern Charcoal No. 1	15 50@ 16 00
Missouri Charcoal No. 1	14 00@ 14 50
Ohio Softeners	16 50@ 17 00
Lake Superior	17 50@ 18 00
Southern	18 25@ 18 50
Connellsville Coke, St. Louis	5 65

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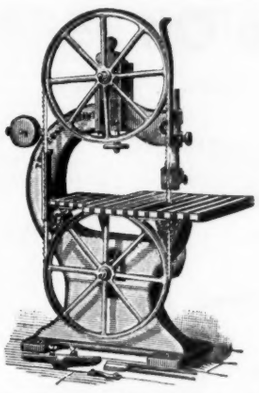

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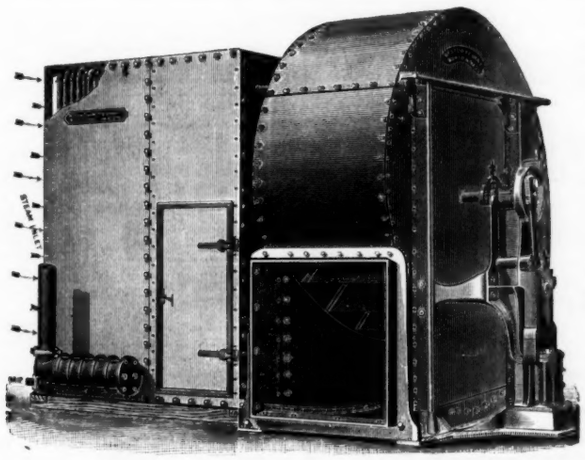

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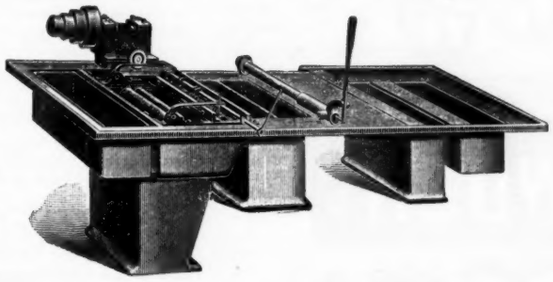

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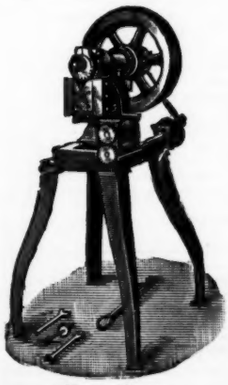

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Old iron rails	$19 00
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	Net Tons
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No. 1 wrought scrap	14 50
No. 1 Machine cast scrap	11 00
Iron axles	20 00
Axle turnings	11 05
Wrought turnings (free from cast)	9 50
Cast borings	6 75
Uncut wrought iron boilers	8 25
Steel boiler Plates	12 50
Grate bars	7 00
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1½ to 4 by ⅜ to 1 inch	1 65
1¼ to 6 by ⅜ to 1 inch	1 70
1¾ to 6 by 1⅛ to 2 inch	1 85
1¼ & 1⅜ by ⅜ to ¾ inch	1 70
1 & 1⅛ by ⅜ to ¾ inch	1 75
⅝, ⅜, ⅞, by ⅜ to ⅝ inch	1 85

Round and Square.

1 to 1⅞ inch	1 65
2 to 2⅝ inch	1 75
2¾ to 3¼ inch	1 90
3⅜ to 4 inch	2 15
4¼ to 4½ inch	2 75
4¾ to 5 inch	3 00

Oval.

⅞ to 1¼ inch	1 85
⅝ to ¾ inch	1 85
½	2 05
⅜	2 25

Half Oval and Half Round.

1¼ to 3 inch	2 20
⅞ to 1½ inch	2 00
⅝ to ¾ inch	2 25
½	2 0
⅜	3 50

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 75
1 to 1⅜ by ¼ and 5-16 inch	1 80
¾ to ⅞ by ¼ and 5-16 inch	1 90
½ to ⅝ by ¼ and 5-16 inch	2 15

Hoops.

1¼ to 4, Nos. 13 to 15	2 40
1¼ to 2, Nos. 16 to 18	2 45
1¼ to 2, No. 19	2 50
1¼ to 2, No. 20	2 50
1¼ to 2, No. 21	2 60
1¼ to 2, No. 22	2 70
15-16, 1 and 1⅛, Nos. 13 to 15	2 45
15-16, 1 and 1⅛, Nos. 16 to 18	2 50
15-16, 1 and 1⅛, Nos, 19 and 20	2 60
15-16, 1 and 1⅛, No, 21	2 70
15-16, 1 and 1⅛, No. 22	2 80
⅞, Nos. 13 to 15	2 60
⅞, Nos. 16 to 18	2 70
⅞, Nos. 19 and 20	2 80
⅞, No. 21	2 90
⅞, No. 22	3 00
13-16, Nos. 13 to 15	2 70
13-16, Nos. 16 to 18	2 80
13-16, Nos. 19 and 20	2 90
13-16 No. 21	3 00
13-16, No. 22	3 10
¾, Nos, 13 to 15	2 80
¾, Nos. 16 to 18	2 95
¾, Nos. 19 and 20	3 05
¾, No. 21	3 15
¾, No. 22	3 25
11-16, Nos. 13 to 15	3 05
11-16, Nos 16 to 18	3 10
11-16, Nos. 19 and 22	3 20
11-16, No. 21	3 30
11-16, No. 22	3 40
⅝, Nos. 13 to 15	3 10
⅝, Nos. 16 to 18	3 20
⅝, Nos. 19 and 20	3 30
⅝, No. 21	3 40
⅝, No. 22	3 50
⅝, No. 23	3 60

Light Band.

1¼ to 6 by ⅛ to 3-16 inch	1 95
1½ to 6 by Nos. 11 and 12	2 00
1 to 1⅜ by ⅛ to 3-16 inch	2 00
1 to 1⅜ by Nos. 11 and 12	2 05
⅞ and 13-16 by ⅛ to 3-16 inch	2 15
⅞ and 13-16 by Nos. 11 and 12	2 20

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⅝ and 9-16 by Nos. 11 and 12	2 45
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⅞ inch, beveled edge, by Nos. 11 and 12	2 20
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Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
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Extra Flange "	4 00
Solid Fire Box "	4 75

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Flange	2 75
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2 to 9-16 in. wide by 2 to ⅝ thick	8

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Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
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Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
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Munson's Short Lap Single Leather	dis 45
Munson's Short Lap Double and Light Double Leather	dis 50
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" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
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Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 30
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
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" Drill	dis 35

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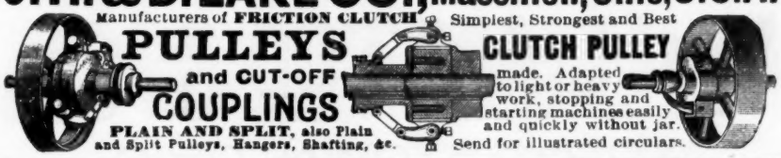

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Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....15c
" " " " over 5 lbs.....12c

Jack Screws.

Illinois Bolt Co. list.....dis 75

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Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¾	3½
Hexagon	15½	11½	8½	6	5¼	5¼	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

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List July 14, 1887.....dis 75
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$1.50
{ Less than car lots...$1.60

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

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Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 9@10
Russia " " .....₩ lb 14
Italian " " .....₩ lb 13@19
Plumbago Piston.....₩ lb 40
Peerless.....₩ lb 60
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48
Rainbow.....{ Full Rolls.....50c ₩ lb
{ Less than Full Rolls. 60c ₩ lb
Eclipse Gasket.....₩ lb 75

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Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 40
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17.....dis 50@50&10
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50@50&10
Copper.....dis 50@50&10

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Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
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" Dexter Cross-cuts.....50c "
" Diamond " .....30c "
" Tuttle Tooth Cross-cuts.....25c "
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Perfection "	$15 "
Detroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Jan. 18, 1884

Brass	dis 30
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	.95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
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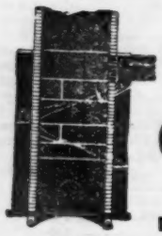

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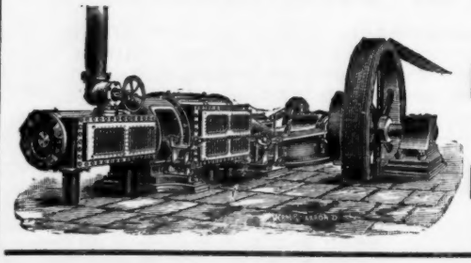

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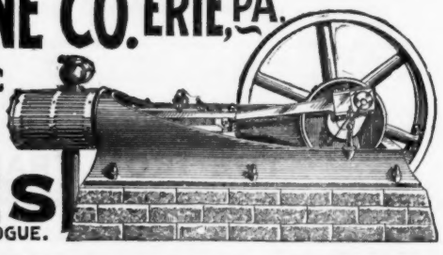

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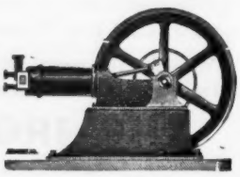

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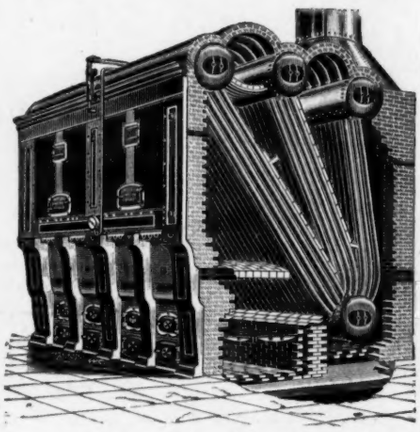

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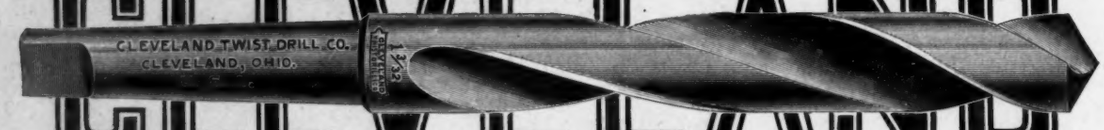

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